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FARMERS DIGEST

AUGUST–SEPTEMBER

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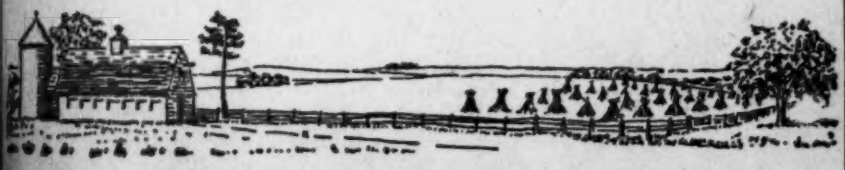

The Farmer's Digest

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The Farmer's Digest

Volume 11 August – September Number 4

New Clovers and Alfalfas

Condensed from The Shorthorn World

Archer P. Whallon

Stockbridge, Michigan

No other class of farm plants is associated more closely and essentially with a permanent and well balanced system of farming than are the two legumes, clover and alfalfa. It is also reasonable to expect, that in time, some of their lesser and neglected relatives, trefoil, lespedeza, lupine, kudzu, vetch, and others, will come to have a larger place in American agriculture. But we must continue to regard these lesser forage crops as adjuncts and supplements to, and not successors of our clover, alfalfa, and sweet clover crops. New developments in these familiar plants will more than enable them to hold their own.

Ladino—the big white clover—seems now to have established its position of worth and practical hardiness over a large range of territory in the northern states, apparently surviving low winter temperatures in latitudes further north than had been expected. Possibly it will not prove to be quite the miracle crop that some have predicted, but its apparent faults are minor ones, the most serious being that as a hay crop it is slow to cure. To date the relatively high price of Ladino seed retards extensive sowing and it is evident that the main concern of the grower should be to make sure of getting seed of unquestionable varietal purity.

While as yet of relatively small and generally localized acreage, a considerable list of new clover strains and varieties are of promise for a wide range of soils and climates. Some are in limited commercial production, and others as yet are in the hands of research and experimental growers and have not been released commercially. Some of them are the results of deliberate crosses or

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hybrids, the work of plant breeders planned to meet some special purpose. Others are importations of natural fixed varieties, new to Americans, but familiar to cultivation in some other lands. To the latter class belongs a creeping-root clover variety advocated as a honey nectar or bee pasture plant, and now coming to be known as the Pellett clover in this country.

Trifoluim Ambiguum, originally from southern Russia or the Caucasus, is called Pellett clover from the fact that it is being propagated as a bee pasture plant by the Pellett bee gardens at Atlantic, Iowa. The blossom of Pellett clover somewhat resembles that of alsike, but is larger and has a short corolla tube, so that the honey nectar is readily available to short tongue insects such as the honeybee. The stem is much like common red clover, and plants may reach three to four feet tall with a top spread of three feet. This clover spreads rapidly from deep rhizomous roots and increases from year to year. At present only root divisions are sold, but the plant can be propagated rapidly by seed as well as by root once sufficient acreage is established to provide a practical seed harvest. Questions as to the range of adaptability of Pellett clover to different soils and climate conditions await further tests, but it is seemingly one of the most promising new clover varieties.

Several new clover varieties may be regarded as of the creeping or root-spreading type There seems to be some confusion and possible duplication of names and further trial plantings are required to straighten out all questions of relationship and identity. A type known as Strawberry clover in the West spreads by runners, somewhat after the manner of strawberry runners, and is reported to grow successfully on wet land where other clovers will not grow. A runner type clover, called Zigzag clover, has been found to be successful in such advanced latitude and short season regions as Vermont. The Subterranean clover, originally from Australia, now being propagated in Oregon, has a peculiar method of growth and propagation. The seed is borne in little burrs close to the ground, some of it being forced under ground, somewhat after the manner of peanuts, where it germinates and comes up year after year.

Largely from more southern territory several superior strains of common red or June clover and of the annual crimson clover are available. The type known as Northern Neck clover is a strain of red clover developed in

Virginia, and the Dixie clover is a variety of the annual crimson clover which has given good results as far north as Columbia, Missouri, and New Brunswick, New Jersey. The so-called Alyce clover, now actively propagated in the South, is an annual legume native to the tropics of Asia, but is not a true clover. It is an upright annual plant making a comparatively quick growth which contains a relatively high (35 to 40) percentage of dry matter. Prospective growers will do well to make small advance garden trials of these and other unfamiliar clover plants to determine their climatic and soil requirements and adaption before attempting extensive sowings.

It was not so very many years ago that to most farmers alfalfa was just alfalfa—with no thought of there being different varieties or type. Today the varietal list is becoming long, a fact due to the need of improved types desirable to meet different climatic and soil conditions, and to resist insect and plant disease attacks. After years of research several wilt resistant alfalfas have been developed. Most conspicuous of these is Buffalo alfalfa, developed after years of experiments dating back to 1928, at the Manhattan, Kansas Experiment Station. This is reported to have very high resistance to bacterial wilt and to maintain good stands in wilt infested areas where the life of nonresistant alfalfa is of short duration.

Another new wilt, resistant alfalfa, the Ranger variety, the result of work of United States Department of Agriculture plant breeders, is highly recommended for wilt infested areas. This is the result of crossing and re-crossing Cossack, Ladak, Dakota No. 12, Hardistan, and Russian Turkestan alfalfas. Still another wilt-resistant alfalfa, this time from the east, the Atlantic variety, developed at the New Jersey Agricultural Experiment Station for eastern conditions, will soon be available. Such wilt resistant varieties, as soon as adequate seed supplies are available, will aid materially in overcoming one of the major problems of alfalfa production. But there are other and more sensational and revolutionary innovations in prospect for the alfalfa future. Possibly the largest promise is offered by the idea of hybrid alfalfas.

It is predicted that the hybrid alfalfa of the future will outyield the standard varieties of today about as much as hybrid corn outyields common open pollinated corn. Preliminary work for the production of hybrid alfalfa has been carried out and good experimental hybrids are already known. It is believed that hybrid

alfalfa will be less expensive to produce than hybrid corn. Only self-sterile plants will be used for foundation stock. As these plants can produce only hybrid seed, consequently bees, the natural pollinators of alfalfa, can be used, and costly hand pollination will be eliminated. Cuttings of alfalfa root easily in sand, consequently outstanding parent plants can be increased to any desired number without changing their inheritance. The group of plants that have descended from a single original plant in this manner are known as a clone, and hybrids or crossings of superior clones can be developed in commercial quantities.

It may well be, however, that public attention will first be captured by the development of quick growing, annual alfalfa varieties which will produce a good crop within the first year from sowing. An annual Peruvian alfalfa from the Estacion Experimental, of Lima, Peru, is now under test growing in the Rio Grande Valley of Texas. This annual alfalfa was brought in through the office of Plant Exploration and Introduction of the Department of Agriculture at the request of W. H. Friend, superintendent of the Weslaco substation of the Texas Experiment Station. This rapid growing alfalfa is described as being unusually vigorous, producing about twice the crop of ordinary alfalfa. But the northern limits of this type of alfalfa have not been determined, and its main value may be as plant breeding material in the development of new varieties. But obviously, the idea of an annual alfalfa which would produce a crop in one season, quite as do millet, buckwheat, or sudan grass, would seem most attractive to dairymen and all classes of livestock farmers.

Another possibility is the development of alfalfa and sweet clover crosses for hybrids, and of sweet clover varieties that are without the bitter taste and more or less toxic or injurious coumarin content of ordinary sweet clover. Coumarin is a white crystalline compound of vanilla-like odor that is found in several plants including sweet clover. This coumarin content in sweet clover, which may vary between plants, different parts of the plants, and the stage of growth, may under some circumstances, be injurious to livestock, as it causes a thinning or deficiency of coagulation quality of the animal's blood. Attempts to develop varieties of sweet clover free from coumarin and entirely safe for stock feed have been made, but the task is difficult and to date, low or coumarin-free varieties are not available in this coun-

try. However, a recent report from Germany states that a strain of Hubam sweet clover with low coumarin content has been developed during the war, and a trial of this will soon be made by American agronomists.

While the matter has been given but little attention in the United States, the problem of "sweet clover taint of flour" has had more attention in Canada. The bitter flavor of flour milled from wheat grown on land enriched by plowing under a sweet clover growth has caused a discrimination against and discount in price of some Canadian wheat on British markets. This has been a serious factor contributing to a reduction of sweet clover acreage in the western provinces. Prospects of plant breeding to overcome these objections to sweet clover are now under way but it may be a matter of some years before really successful results are obtained and given commercial release.

For the present, aside from all considerations of modification of the chemical content and flavor factor of the sweet clover plant, some new varieties productive of better quality hay and forage, and to some degree, weevil and disease resistant have been produced. Best known of them is Madrid, a biennial yellow variety, originally from Spain. This has a finer stalked and more leafy growth than the common types.

There are several other new sweet clover varieties: Alfba, Evergreen, Sangamon, Brandon Dwarf, Erector, Albatrea, and others, for all of which are claimed some special features of value. Some of these are not in commercial production and seed of all is scarce. Prospective growers should watch closely for announcements of commercial releases of improved sweet clover varieties and obtain comparative data as to the merits of different types. It is still pertinent to emphasize that sweet clover is about the best northern crop for the reclamation and improvement of many soils of low fertility and that as a honey producer and bee pasture plant it is very desirable. With the elimination of the objectionable coumarin and wheat taint features, sweet clover easily may become a major factor in northern livestock farming.

The list of more or less closely related clover-like legumes proving to be of value in American agriculture is rapidly being extended, and far too long to be given adequate treatment here. It is enough to say that while many of these plants are more adapted to southern agriculture, their exact territorial range has not always been detemined and

that experimental plantings are justified over a wide range of territory. In this list we may include a new "Big Trefoil," several lespedeza varieties, the kudzu vine, the Wagner pea, guar, two new vetches, La Fayette Monantha and Auburn Wollypod, Indigofera Hirsuta, a new summer legume grown in Florida; the new palatable Crotalaria lanceolata; and the edible Blue and Yellow lupines, the so-called "sweet lupines" of the Deep South, all of which may be found of value over a larger region than at first thought might be expected.

New Plant Food

A brand new chemical, Uraform may be the answer to our long-felt need for a good one-shot nitrogen fertilizer.

This new plant food, developed by USDA men at Beltsville, Md., is a combination or urea and formaldehyde. Tests so far show that it's even better than barnyard and green manures at supplying nitrogen *gradually over a long growing period.*

And unlike the plant foods we're now using, it doesn't leach out of the soil easily.

It looks, so far, as if it will be a fine source of nitrogen for corn, potatoes, and tobacco–crops which often need side-dressing.

Its delayed action, and the fact that it releases plant food over a long time, will also make it good for lawns, hay fields, and pastures.

USDA men have tried it both alone and mixed with other fertilizers, with equally good results. It doesn't cake if it happens to get wet.

Both urea and formaldehyde are scarce chemicals now, so Uraform is still in the test stage. We'll have to wait for the new plant food until these chemicals are more plentiful. But it's something to keep an eye on.

Farm Journal

Cooling Milk to Warm the Profits

Condensed from Electricity on the Farm

From the standpoint of health, any milk used for human consumption is better if it is cooled immediately after being drawn. Most dairymen, however, are not in business just for health. They make money by cooling milk.

There are a number of ways of making a profit on milk cooling. 1. You get a premium on higher quality. 2. You are enabled to sell market milk instead of milk for butter or cheese. 3. You save summer rejections of sour milk. 4. Because of good quality you have a preferred market; less goes into surplus. 5. If you sell sweet cream, it may save you a trip or two a week to the cream station. 6. In many places milk ordinances make it necessary to cool milk in order to sell it at all.

The best way to cool milk depends on the requirements of your market, how and when you ship, and the gain realized by cooling. Many farmers who sell to butter and cheese factories cool with well or spring water. Some still use ice. The mechanical cooler has become one of the most popular pieces of equipment on dairy farms.

With the aid of Prof. John E. Nicholas, research agricultural engineer of Pennsylvania State College, we have prepared some typical milk-cooling curves. They tell you what you may expect from the different methods of cooling. The curves are based on experimental work done at the Pennsylvania Agricultural Experiment Station. The conditions are such as one might expect to find on farms.

Since the bacterial count in milk does not increase much until about two hours after milking, it is important to have the milk temperature down by the end of those two hours. Some bacteria or spore growth takes place at practically all temperatures. The rate of growth is greatly reduced as the temperature is lowered. At 70° or above, the bacteria increase several hundred times as fast as at 50°. At 60° the increase takes place much slower. This is the temperature at which milk must reach some plants to be accepted. For higher quality milk, the temperature should be reduced to 50° or below and held at that point. If the milk is to be on the truck for some time, or hauled

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during the heat of summer days, it should be colder to start. Milk cools much faster in water than in air. Cans should be submerged in water below the level of the milk in the cans. Leave the can lids on when cooling.

The top cooling curve shown in the diagram is for one 10-gallon can of milk in a tank of 110 gallons of water. The water at the start was 56°; the milk 90°. In one hour the milk was cooled to 64½°; in two hours to 62½°. At the end of eight hours the water and milk were both at about 60°. No water was added to the tank. Neither the water nor milk was agitated. But note that there was 11 times as much cooling water as milk.

It should be pointed out that all the curves represent average milk temperatures in the can. The milk temperature at the top of the can was from 3° to 10° higher than at the bottom. It remained higher throughout the entire cooling period. In the case just cited the milk at the top of the can was 68° at the end of one hour and about 66° at the end of two hours. At the end of eight hours it was 65°. This difference in temperature is the reason for stirring milk as it is cooled. There is considerable doubt whether the evening up of the temperature by stirring more than offsets the bacteria introduced on the stirrers. It depends upon the cleanliness and care used in handling the stirrers.

The second curve represents the cooling of one 10-gallon can of milk in 120 gallons of water with fresh water running into the tank from the tap at the rate of about 20 gallons per hour. The milk was at 90°; the water 58°. Note that although the water was 2° warmer than the still water in the first test, the cooling was faster. This was due to the flow of water past the can, and to keeping the temperature down to that of the tap water. Allowing for the 2° difference in water temperature, the advantage of tap water at the end of one hour was 3°. At the end of two hours it was also 3°. The milk temperature at the top of the can at the end of two hours was 63° (61° allowing for difference in water temperature).

The third curve is an ice and water cooling curve. One 10-gallon can of milk was placed in 110 gallons of 55° water and 25 pounds of ice added. The average milk temperature at the end of one hour was 61.8°; two hours 58.5°; eight hours 55.7°. The top of the can at the end of two hours, 61°. The water remained at 55° throughout the cooling period. The 25 pounds of ice was melted at the end of the 3rd hour. After 6 hours the cooling water and milk began

to warm up. More ice and less water would give somewhat faster cooling.

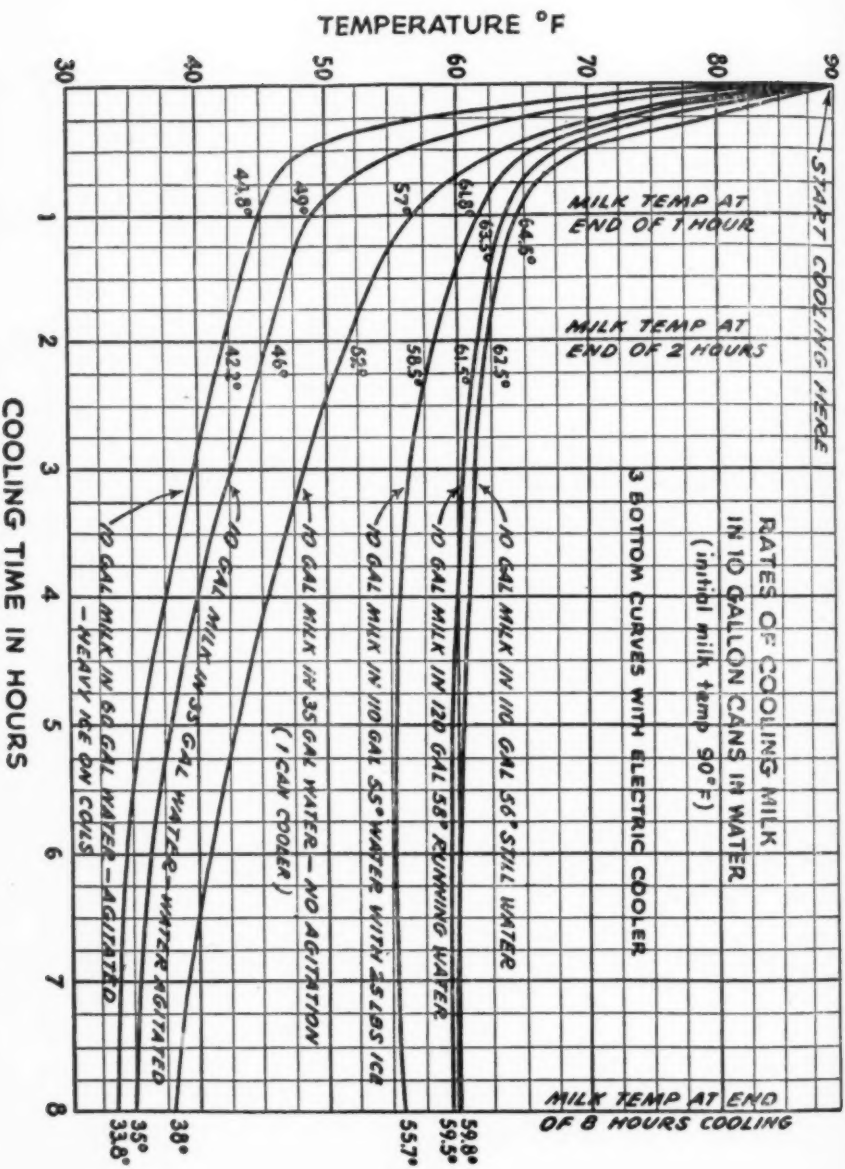
The fourth curve from the top represents the cooling of one 10-gallon can of milk in a one-can electric milk cooler. Water to milk ratio was 3½ to 1. The temperature of the milk at the start was 90°; the water 35°. There was a bank of ice on the coils. No agitation. In one hour the average milk temperature was down to 57°; in two hours to 52°; and in eight hours to 38°. At the end of one hour the top milk was 61°; after two hours at 57°.

The fifth curve shows the cooling of one 10-gallon can under conditions identical with the fourth curve except that the water in the cooler was agitated. At the end of one hour the average milk temperature was 49°; at two hours 46°; at eight hours 35°. It is also significant that at the end of one hour the top milk was down to 52°; and at the end of two hours to 49°.

The bottom curve shows what can be accomplished with an electric milk cooler with agitation when there is sufficient ice built on the coil to keep the water temperature from rising above 40°. At the end of the first hour the average milk temperature was 44.8° and at the end of the second hour 42.2°. The top and bottom temperatures were 48° and 42° at the end of the first hour and 46.5° and 38° after two hours. The final average temperature at the end of the cooling period was 33.8°. That's ideal.

The curves shown are for specific conditions. You should understand that different sizes of coolers, different water to milk ratios, and different methods of agitation will give different results. Also, on many farms the spring water or tap water will not be as cold as 58° in hot weather. Don't guess. Measure it with an accurate thermometer. In general the curves shown are representative of what you may expect to take place in milk coolers of common sizes used on farms.

One statement should be added. Where cooling milk to 50° or lower is necessary on farms, there is probably no piece of electric farm equipment which has paid its way and made more profit than the electric milk cooler. The best proof is the dairyman who uses one.


TEMPERATURE °F
30
40
50
60
70
80
90
START COOLING HERE
RATES OF COOLING MILK IN 10 GALLON CANS IN WATER
(initial milk temp 90°F)
3 BOTTOM CURVES WITH ELECTRIC COOLER
MILK TEMP AT END OF 1 HOUR
MILK TEMP AT END OF 2 HOURS
MILK TEMP AT END OF 8 HOURS COOLING
44.8°
49°
57°
64.8°
63.5°
64.5°
46°
52°
58.5°
62.5°
61.2°
59.8°
59.5°
55.7°
42.2°
38°
35°
33.8°
10 GAL MILK IN 110 GAL 56° STILL WATER
10 GAL MILK IN 120 GAL 58° RUNNING WATER
10 GAL MILK IN 110 GAL 55° WATER WITH 25 LBS ICE
10 GAL MILK IN 35 GAL WATER — NO AGITATION
(1 CAN COOLER)
10 GAL MILK IN 35 GAL WATER-WATER AGITATED
10 GAL MILK IN 60 GAL WATER — AGITATED — HEAVY ICE ON COILS
COOLING TIME IN HOURS
1
2
3
4
5
6
7
8

4,000 Quarts Every Minute

Condensed from Nation's Business

C. Lester Walker

ANY account of the ice cream business should begin by stressing the fact that the American appetite for this ambrosia is no trivial matter. Every year Americans eat about 500,000,000 gallons. That is *a lot*. And if you will pile it all up it is big enough to ski down—an alp a quarter of a mile around at the base and 150 feet high.

This tremendous American appetite for ice cream can be traced, quite appropriately, back to the colonial fathers who brought the first knowledge of ice cream making with them from across the Atlantic Ocean.

One of the earliest references to ice cream in America is in a letter written in 1700 by a guest of Governor Braden of Maryland, which told of being served "a dessert no less Curious; among the Rarities of which it was Compos'd, was some fine Ice Cream which, with the Strawberries and Milk, eat Most Deliciously."

By the time of the American Revolution this delicacy had been popularized and advertisements appearing in the New York *Gazette* in 1777 offered to "serve the Ladies and Gentlemen of this garrison upon the most favorable terms, with ice cream." British Redcoats were stationed in the city at the time.

On the Continental Army side, George Washington served this dish at Mount Vernon. Gen. Anthony Wayne, hero of the Battle of Fallen Timbers, sang its praises after returning from a campaign.

Then one summer's day in 1813, Dolly Madison, the wife of the fourth President, served ice cream at a state function in Washington.

"Introduced this confection to Washington Society," was the way the papers reported it. They also noted: "the flavor was strawberry."

Considering the heaven-bestowed nature of the product, the industry got off to an unbelievably slow start. For almost 40 years after Dolly Madison, only retailers—and confectioners, at that—made and sold ice cream. There was not a wholesaler in the country until 1851.

Then (it was in President Millard Fillmore's reign) a Mr.

Reprinted by permission from the Nation's Business, Washington, D. C., August, 1946

Jacob Fussell, a Washington, D. C., milkman, started wholesale manufacturing. He had a reason that sounds quaint today. He wanted a way to use up his *surplus dairy products!* (The Fussell Company, incidentally, is still in business in Washington.)

Fifty years after Fussell started, you might suppose that ice cream would be on every American tongue. But no—it was still in the "home industry" category; mostly the product of little confectioners in the towns and little dairies lost among the cloverfields. And heaven knows what would have happened to America if Harvey Miller hadn't come along.

Mr. Miller, an Ohioan, invented the brine freezer. That led to large-scale production. And that led to the conquest of America by ice cream.

Of course, large-scale production had some help along the way. The ice cream business is a business of surprises. It always has been. Something new and unexpected always has been popping up in it to catch the American fancy and palate and whirl ice cream sales even higher.

Robert M. Green, a Philadelphia soda water manufacturer, is generally credited with having introduced the ice cream soda in 1874 at the semicentennial at Franklin Institute in Philadelphia. Another account gives credit to Fred Sanders, of Detroit. In 1875 Fred substituted ice cream for sweet cream when the latter had soured on an especially hot day, and turned up with an ice cream soda.

In 1904 came the first cone. It appeared at the St. Louis World's Fair. It made a sensation. The cone was hailed as the most important contribution to the amenities of eating since the invention of the fork. People from the Statue of Liberty to the Golden Gate went home and raved about it and about what went on top of it; and ice cream, overnight, skyrocketed.

Then what should come along but the sundae—with, of all things, a religious origin! In Evanston, Ill., the young blades of the town were frittering away so much of the Sabbath at the soda fountains that the town fathers became alarmed. They passed an ordinance that forbade sales of ice cream sodas on the Lord's Day.

The fountains then served "Sunday Sodas," which had everything except the soda. The customers liked them so much they started asking for them on Mondays, saying, "Give me a Sunday." When the god-fearing folk objected to a dish being called after the Sabbath, the fountains changed the spelling to *sundae.* But that didn't change the demand. That kept right on

rolling over all the woods and templed hills.

Even in the winter of 1921-22 —considered in those days a depression period "when nobody would buy anything"—the ice cream industry broke out with a fantastic skyrocketing surprise. This was that rapturous, chocolate-coated, Elysian creation called Eskimo Pie. A baker first put it on the market in Milwaukee and Chicago. In 60 days it had 100,000 retail handlers. In 90 days Americans were eating 4,000,000 Eskimo Pies daily. Ice cream had done the unheard of again. A "sensational" product had turned itself into a round-the-year commodity.

And what do we have today? Same thing: an industry of incessant wonders and surprises. Things are going on in it that even the six-helping ice cream eaters could not dream of.

Take, for example, its size. The business is fairy-tale-like in its immensity. How many of you ice cream gourmets, who help put away 4,000 quarts in every minute of every day, are aware that, to keep this divine nectar cooling the great American palate, the industry buys a Mississippi of milk every year—about 6,000,000,000 pounds in 1945!

Every year for ice cream alone 70,000,000 pounds of fruit ripen in the American sun. Thirty million pounds of strawberries and 13,000,000 of peaches are included. Nine million pounds of nuts go into it and onto it—7,600,000 pounds of pecans alone.

There are more flavors than any other food of man ever known. More than 150 were listed one year—some of them gems of creative fancy, such as cantaloupe, apple betty, coconut-pineapple, date nut, green gage, plum pudding, pumpkin, root beer. Three were mystery flavors: butter brickle, diabetic, and Chicago! And California, it is known, goes in for avocado ice cream, and Alabama for sweet potato.

But even so, the old favorites still rule the national taste. Vanilla accounts for 51.26 per cent of all the American ice cream sold. Chocolate claims 16.36 per cent, and strawberry 7.95. After them string along butter pecan, peach, maple, cherry, pineapple and coffee.

Ice cream's ingredients today are another thing to surprise most people. The American who "knows what's in ice cream" because he used to turn the hand freezer in the barn on Sundays would scarcely understand a group of ice cream manufacturers if he overheard them talking shop.

"Serum solids," they say. "Carageen. Stabilizer. Overrun."

Well, serum solids are kinds of whole food particles in milk, and

Jacob Fussell, a Washington, D. C., milkman, started wholesale manufacturing. He had a reason that sounds quaint today. He wanted a way to use up his *surplus dairy products!* (The Fussell Company, incidentally, is still in business in Washington.)

Fifty years after Fussell started, you might suppose that ice cream would be on every American tongue. But no—it was still in the "home industry" category; mostly the product of little confectioners in the towns and little dairies lost among the cloverfields. And heaven knows what would have happened to America if Harvey Miller hadn't come along.

Mr. Miller, an Ohioan, invented the brine freezer. That led to large-scale production. And that led to the conquest of America by ice cream.

Of course, large-scale production had some help along the way. The ice cream business is a business of surprises. It always has been. Something new and unexpected always has been popping up in it to catch the American fancy and palate and whirl ice cream sales even higher.

Robert M. Green, a Philadelphia soda water manufacturer, is generally credited with having introduced the ice cream soda in 1874 at the semicentennial at Franklin Institute in Philadelphia. Another account gives credit to Fred Sanders, of Detroit. In 1875 Fred substituted ice cream for sweet cream when the latter had soured on an especially hot day, and turned up with an ice cream soda.

In 1904 came the first cone. It appeared at the St. Louis World's Fair. It made a sensation. The cone was hailed as the most important contribution to the amenities of eating since the invention of the fork. People from the Statue of Liberty to the Golden Gate went home and raved about it and about what went on top of it; and ice cream, overnight, skyrocketed.

Then what should come along but the sundae—with, of all things, a religious origin! In Evanston, Ill., the young blades of the town were frittering away so much of the Sabbath at the soda fountains that the town fathers became alarmed. They passed an ordinance that forbade sales of ice cream sodas on the Lord's Day.

The fountains then served "Sunday Sodas," which had everything except the soda. The customers liked them so much they started asking for them on Mondays, saying, "Give me a Sunday." When the god-fearing folk objected to a dish being called after the Sabbath, the fountains changed the spelling to *sundae*. But that didn't change the demand. That kept right on

rolling over all the woods and templed hills.

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most American ice cream (which is usually 80 per cent total milk products) contains about 20 per cent of them. They contain the protein, minerals and calcium that are so good for the ice cream eater.

Stabilizer is the gelatine that gives modern ice cream its good texture. It coats the butterfat particles and keeps them from packing down. Without it your flavor would be full of icicles. Some stabilizer is animal gelatine, some vegetable. Carageen is the oddest. It comes from a sea weed which is dredged from the cold ocean floor off Nova Scotia. Like other stabilizers, about a spoonful goes into each gallon of ice cream.

The "overrun" which ice cream people talk about is the air they whip into the ice cream. Without it ice cream would be as palatable as bread without yeast. Just a solid frozen chunk! Your best and smoothest ice cream is therefore about 50 per cent free air!

How much actual cream? American ice cream has plenty. The various states specify how much—what minimum—of butterfat *must* go in. Usually it is from 10 to 12½ per cent. Some makers go higher. The Schrafft's restaurant chain once made an 18½ per cent product.

But—a curious thing—extra high butterfat content doesn't necessarily make the best-tasting ice cream. Often what determines that is the proportion of all the ingredients and the expert way the ice cream is made.

The making, today, is one of those things you usually see only in dreams about Wizard of Oz Land. The method, the latest, is known as the "continuous freezer process." It is one of those wonders of the industry.

Everything from start to finish is glittering tile and stainless steel—that sort of thing. The ingredients first are put into a pasteurizer, even though, like the milk and cream, they may have been pasteurized before. Air, carefully controlled, is then let in.

Thirty minutes later, completely mixed and sterilized, everything moves on through pipes to a machine that homogenizes. That is, 3,000 pounds of pressure break up—almost atomize—all the butterfat particles, so the ice cream will be smooth.

It passes through a cooler, through a holding tank, and then into a freezing tube which is surrounded with refrigerant. Inside, revolving blades beat it, and as it freezes, they pull it along. Ten seconds later it comes out a continuous cylinder of ice cream—like toothpaste out of a tube. Containers take it—at the rate of 1,000 gallons an hour, or enough to serve 24,000 persons!

This *fantasia* is one reason

that the bulk of American ice cream is made nowadays by large operators.

And, typically, other revolutions are in progress. The quick-freeze process for foods is changing the ways of flavoring. Tons of these "frosted" fruits now go into ice cream.

Other fruits get their flavors in, new style, in the form of *purees!* Black raspberry, for instance, is one. One minute from the sun-warmed vines, the black raspberries go through an extractor, the same as is used to make tomato juice. All seeds and air are removed! and the resulting *puree* is then frozen in 30-pound cans at ten below zero.

Curiously, for a reason unknown, the *purees* hold both their flavor and color better than the uncrushed frozen fruits.

The ice cream of the future? Same as before—an industry of infinite surprises.

A Los Angeles company is already manufacturing vitamin-enriched ice cream. It has all nine vitamins and can be stored for months without deteriorating.

Then you can expect mineral-reinforced ice cream. Phosphorus will be one of the diet-needed ingredients.

Penicillin ice cream is another future certainty. Just for the sick, of course.

And the ice cream of tomorrow may be sold differently. Drug stores lead in its sale now (28 per cent) but groceries and bakeries are going to vend a bigger share.

Another change, the industry expects, will be bulk sales to individuals. The American ice cream enthusiast will fool around less and less with pints and quarts. He's going in for gallons at a time.

On the other hand, the American who eats his ice cream at the soda fountain stool may find "bulk" on the wane. His serving may soon come prepackaged: a slice or a cube. Portions for cones can be individually wrapped, like a lollypop.

This trend may lead to ice cream vending machines.

The whole ice cream industry at this date is dreaming dreams and seeing visions. It has set its eyes on 1955 and a particular goal. It intends that by that date Americans shall be eating 1,000,000,000 gallons a year!

Multiple Farrowing Means More Sensible Marketing

Condensed from Hog Breeder

Lew P. Reeve

Manager Hormel Hog Buying

RECENTLY, in conversation with other hog buyers we came to the conclusion that we didn't spend much time buying hogs. We decided, in other words, that instead of buying, much of our work consisted of trying to decrease the "gluts" in November, December, January, and February; and trying to encourage the marketing of hogs during the months of extreme scarcity, July, August, and September. We took a look at this traditional "feast and famine" method of supplying the yearly pork needs of the nation and were amazed at what it all added up to in terms of hardship on the packer and the producer.

To begin with, the packer has to acquire a lot of extra brick, mortar and equipment to process the peak load. When the peak load has passed, he then has to try to find hog supplies to keep this investment in use.

Furthermore, as approximately 40 per cent of the yearly supply is marketed in four months, he has to erect and maintain expensive freezers capable of holding this meat until the public wants it.

Also, during the four month period of oversupply when the stock yards are jammed, the bruised and crippled hogs, which are an unwanted by-product, cost millions of dollars alone. Along with this we find that further dollars are lost in tissue shrink which occurs when hogs are held too long in yards before killing.

Generally speaking, the present marketing pattern also creates excessive burdens on the packing house's labor force during the four feast months and leaves them with too little to do during the four famine months' period.

When the marketing situation is looked at from the producer's point of view there is one inescapable fact that transcends all others—namely, that while it is impossible to put a dollar-and-cents value upon the amount lost by the present blind method of hog production, it is truly a stag-

Reprinted by permission from the Hog Breeder, Chicago, Illinois, June, 1947

gering sum even in these days when the tongue has become glib about the word million.

To illustrate this, the following chart has been prepared. We find that you can take any five or ten year period since marketing figures have been kept and find that the November, December, and January figures would be from 60 cents to $1.00 cwt. lower on an average. When thinking of this it is best to do so in terms of normal hog price. While a dollar may not mean much to the $27.00 hogs of today, it means a lot to the $15.00 hog and even more to the $10.00 hog.

(The following table covers all hogs marketed at public markets from the years 1915 to 1934, giving the totals for each month in those 20 years and the average price paid for hogs at Chicago for each month.)

Month	Receipts	% Mkt'd. Per Month	Chicago Price
Jan.	4,839,000	11.4%	$ 9.32
Feb.	3,923,000	9.3	9.68
Mar.	3,605,000	8.5	10.25
April	3,250,000	7.7	10.23
May	3,462,000	8.2	10.15
June	3,347,000	7.9	10.05
July	2,911,000	6.9	10.31
Aug.	2,610,000	6.1	10.37
Sept.	2,611,000	6.2	10.51
Oct.	3,329,000	7.9	9.81
Nov.	3,932,000	9.3	9.22
Dec.	4,465,000	10.6	8.92

One method which has been advocated is multiple farrowing. This system is based on each farmer keeping three sets of sows which would farrow two litters of pigs a year. The sows would be bred to farrow every two months throughout the year and hogs would be marketed every sixty days throughout the year.

Let's follow this plan through on a typical farm which would annually market twelve litters of pigs per year. Normally, 80 per cent would be farrowed in the spring and consequently hit the low market, while 20 per cent, or the fall crop, would be marketed at the time of a high price. However, under the multiple farrowing system, farrowing would be spread throughout the year. Six sows would be kept and divided into three lots of two sows each. Approximately 30 per cent of the total cost of producing pork is found to be in the maintenance of the breeding herd, and multiple farrowing is based on the most efficient utilization of the breeding herd. This can be accomplished partly by having each sow farrow two litters within a year. In planning the date of farrowing, allow the standard saying of "three months, three weeks and three days" for the gestation period. After farrowing, small pigs should be with the sow for 63 days. Since sows come into heat three days after weaning and should be bred then, the length of the suckling period can be used as a regulator to space the farrowing to exactly every six months. From the sow the pigs go into the weaning pens for 60 days and after 60 days in

the fattening pen they are off to market in approximately 180 days. Any necessary adjustments, due to conflict of farrowing, may be made by advancing all lots with the growing and fattening pigs doubling up for a short period of time.

The multiple farrowing system makes the maximum use of all the hog raising equipment. None of the buildings are idle at any time during the year. Let's look at what a hog house costs on a per pen basis under the present system. A $6,000 hog house, just for illustration, will be usable for twenty years. In other words, it would cost $300.00 a year for an annual basis. Now, supposing the house has nine pens, the yearly overhead would be $33.00 per pen. Under the present system you have to pay this "pen rental" on what one and one-third sows can bring you. On a multiple farrowing basis it would be charged to six sows a year.

Labor is better distributed. Today the majority of hours spent on hog production comes all at once in one great concentration at farrowing time. Under the multiple farrowing plan the onerous burden of spring farrowing is spread over the entire year. Also more care can be taken with less time involved. This means that you can pen breed and keep accurate breeding dates.

In our section of the country with its dairy industry, multiple farrowing will provide the farmer with a steady twelve month usage for his skim milk instead of today's scheme where there aren't enough hogs for the skim milk part of the year and too many hogs for it the rest of the year.

However, the major gain of multiple farrowing is that uniform marketing all the year around would tend to eliminate market fluctuations brought on by an oversupply of hogs and let the market reflect the true value of the pork.

Three Money-Making Ideas

Condensed from Farm Journal

John A. Rohlf

NINE years ago C. M. Long, a graying, 58-year-old ex-Missourian, left a high-salaried job because of an idea.

Too many farms are "sick" and need a "doctor," Long decided.

Long looked on each farm as an individual "case," whch only individual treatment could cure. So he set up a unique "Farm Clinic," to diagnose each case and prescribe its needs.

Long was no city-farmer theorist. He had farmed and managed farms for 40 years, and in almost as many states. Today he is handling farms in Indiana, Illinois, and Ohio, and has worked out plans on more than 75,000 acres. Many of the farms are owner-operated, but other owners live in Cuba, New York, Texas, West Virginia, Illinois, Ohio, and Indiana.

If landlord and tenant follow his prescription, the sick farm gets well—and both tenant and landlord make money, even while the patient (the farm) is recovering.

From the Long Clinic has come a steady stream of practical, common-sense farming ideas. Some of them could probably make *you* more money.

1. FIND WHAT THE SOIL NEEDS

The first of these principles is that you can't do anything for a farm unless you know what it actually needs. So Long analyzes practically every acre to find out what kind of soil it is, how much erosion, what the slope is, and whether the soil lacks lime, nitrogen, phosphorus, or potash.

Long soon found that most of his clients' farms needed organic matter or humus, as well as mineral plant foods. Heavy grain-farming and erosion had used up Nature's supply.

2. BUILD THE FARM WITH GRASS

So that brought him to the second of his ideas—more grasses. He was satisfied that if it were done right—the best adapted grasses put to the best use—one would make just as much money as by grain farming. And it would also put the soil in better condition.

It wasn't hard to sell that idea to dairy farmers. Most of them already realized that grass was their cheapest feed. But the beef

Reprinted by permission from the Farm Journal, Philadelphia, Pa., June, 1947

men argued. "You just can't raise beef on grass," they said, "Corn makes the beef."

Finally Long talked a few farmers into dividing their feeders, putting some on pasture with little grain, and the others on the regular heavy grain-feeding program.

There were few arguments after that. Now on the Long "clinicized" farms, the bulk of the corn goes into hogs, not cattle.

Corn yields on these farms have climbed 9 to 50 bushels an acre, and meat production per acre (a favorite Corn Belt yardstick) has been boosted as much as 100 per cent. And in practically all cases, with *less labor!*

Operators on the Long-planned farms are like farmers anywhere; they don't convince easily. But when they're sold they don't mind saying so.

A renter on one of the farms told me recently, "I can fill the landlord's crib with only half as many acres as it used to take."

Another says that when he moved onto his present farm five years ago, the previous tenant warned him that 40-bushel corn was the best he could get. The last three years it has averaged 75.

Or take the case of J. Everett Jones. He became a Long client three years ago. He had only 120 acres in the home farm, and Long suggested he buy a nearby 120.

The asking price for the badly run-down land was $78 an acre. That seemed high to Jones, but when Long checked on the soil and told him he could grow 75-bushel corn the first year, he bought it. That's just what the crop yielded—nearly enough to pay off the purchase price. Long's prescription—a heavy application of plant food on the plow sole—had turned the trick in one year.

The improvement in pastures has been just as spectacular. Cattle do better on fertilizer-fed pasture, especially the lush-growing kind you see on the Long farms. In the fall of 1941, just 75 head of range calves were shipped in; last fall the number topped 2,500.

Weighing between 300 and 400 pounds, these calves are roughed through the winter on a little grain and a lot of hay. In April they go on grass legume pastures. About three months later, self-feeders are hauled to the fields and kept filled with ground ear corn. About 20 bushels of corn are fed during the 90- to 100-day finishing period. The calves gain from 2 to 2.5 pounds per day from the time they go on grass until sold.

These farmers have made $50 to $80 an acre from their pasture and labor. That's as much as

they could have made from 80- to 100-bushel corn. And don't forget that they also kept the soil at home and built it up with humus.

That $50 to $80 figure is one that Long likes to use, although most of the 1946 calf crop did far better. For example, on the Indiana Farm of I. C. Elston, Jr., the calves were turned out on grass April 20—nearly *two head to the acre*. Weighed on August 1, 100 days later, they had gained an average of 237 pounds each. Then self-feeders were pulled out on grass, and the calves fed corn the next 100 days. Gain: 200 pounds each.

The grass wasn't quite as good from August 1 on, but the beef-per-acre figure still ran over 800 pounds.

Long's third big idea is about buildings. In fact, he has several ideas. They're different, but they're practical.

3. Make Buildings Movable

In the beef cattle and hog set-up he would have *all buildings movable,* with the possible exception of a central granary. He has found that the best place to store hay is in "haymows" in the field. Long's clients build them of a 2′x6′ framework, line them with snow fencing and put them on skids. On either side of the hay mow they line up sturdy shelters (also on skids), made with large roof overhangings, which face the mow stanchions where the chopped hay feeds down.

For hogs Long favors two-pen houses with overhangs, without floors but with the ever-present skids. By placing two of these units together you have a combination farrowing house for four litters, with an alley-way large enough for feed storage, or a heating unit. It also has a high enough ceiling (7′) so that a man doesn't have to go about in a half squat.

Corn for fattening spring pigs is stored in the field when it is picked. The big 1000-bushel cribs are used as self-feeders when the pigs weigh 75 to 100 pounds.

All feeders for cattle and hogs are movable. When a feeder is empty, it is moved and refilled. This saves hauling manure, and *everybody* is in favor of that.

Long is convinced that the place for the first cutting of hay is in the silo. His latest idea, which is just now getting underway, is a movable silo. He figures that it takes no longer to feed silage in the field than it does in the barn. Time will be saved in filling the silos, because of shorter hauls, and again there's less manure to haul.

One of Long's favorite ideas is to plant a grass or cereal grain with the last cultivation of corn. This provides extra feed, and keeps the soil from washing.

He points with pride to one of his star clients who now does this. This man turns sheep into the fields in late summer. By silo-filling or corn-picking time he has a grass-free field with a covering of rich manure.

Another farmer, who uses his stalks for winter range for his brood sows, plants soybeans with the corn. "That's cheap protein," says Long, "the mark of an efficient farmer!"

Mentally vigorous, and physically the equal of most men 20 years younger, Mr. Long has the all-around farm "know-how" that few people possess. If he doesn't know the answer to a problem, he finds it. Nothing is ever done merely because it is someone's opinion. He insists on experience to back up each decision!

That's C. M. Long. He's more than a good farm manager—he's one of agriculture's modern pioneers.

How Much is Manure Worth?

Everybody knows that manure helps grow bigger crops, but how many know how much it is actually worth?

Iowa State College crops and soils men used a rotation of corn, corn, oats, meadow, meadow, and put on two tons of manure per acre each year. Higher yields made the manure worth $9 a ton.

Corn yields climbed 23 bushels per acre, oats 13 bushels, and the hay crop increased nearly a ton per acre over similar non-manured land.

To get best results, they found, you need to use plenty of bedding in your barns and sheds to absorb the liquid; then haul directly from the barns to the fields. Besides increasing yields, the manure holds soil moisture, cuts down erosion, and encourages bacteria and earthworms.

Farm Journal

Roughage for Dairy Cattle

Condensed from Holstein-Friesian World

C. I. Huffman

Dairy Department, Michigan State College

ROUGHAGE consuming livestock contribute to society by converting roughage crops which aid in soil conservation and soil building into human food. The ruminant is especially geared to do this conversion job.

The negative part of the plant is much more variable in nutritive value than the seed. In order to use roughages more efficiently as feeds for livestock, it is essential to know about the changes which take place in the development of a plant. Grasses and legumes consumed at the joint stage or before have been referred to as watery concentrates due to their great nutritive value, especially for milk production. Some of the changes are well known. For instance, young grasses when very young may contain 25 to 30 per cent protein on the dry basis, but when in the ripe stage the protein may be as low as 6 per cent. Legumes show a similar drop, but level off at 10 to 12 per cent.

Great stress has been placed upon the importance of the amount of protein in the ration in formulating grain mixtures to be used with roughages of different protein levels. Although this is an important factor, yet in the near future, the role of the various amino acids will be investigated. A study along this line has not been feasible due to the high cost of pure amino acids. For instance, we need to know which amino acids are synthesized by the microflora of the rumen and the special functions of the various amino acids in farm animal nutrition.

The most important loss, however, is not the constituents which the chemist can determine in his laboratory, but an unknown factor which stimulates milk production. The young pasture grass exerts a marked affect on milk flow, but that same pasture grass when mature has lost its kick. The only way in which we can test for this potent factor is by the use of cows depleted on legume hay alone following freshening. After about 6 to 8 weeks, milk production levels off and the cow is ready for the test. A certain amount of total digest-

Reprinted by permission from the Holstein-Friesian World, Laconia, N. Y., May 3, 1947

ible nutrients in the hay is replaced by an equal amount of nutrients in the feed to be tested. Hay cut in early bloom is much superior to hay cut in full bloom as is shown by increased milk production against the tide of lactation. This simply means that there is more milk in early cut hay.

All the grains which we have tested show the presence of this unknown milk producing factor. On many dairy farms, this factor is the first reason for feeding grain. When full bloom hay is the only roughage, more grain is required to balance the ration than when early cut hay is available. The drop in milk producing power with maturity is the first great loss in a roughage program.

Other changes which occur in the pasture and hay crops as they mature reduce their feeding value. Probably the most important of these is the drop in digestibility which takes place just prior to the bud stage. There is a toughening change that takes place in the plant at this time in order to prevent lodging. The loss of digestible calories due to this change is enormous, and gives the second great loss in the nutritive value of roughages.

It is apparent that roughage used at the hay stage of development has lost a large amount of its nutritive value. The only practical method of using roughages at the peek of their nutritive power is through the use of properly controlled pastures.

The third great loss of nutrients is the loss brought about during conservation. A large amount of research has been conducted during the past decade on this important problem. The fact remains that most roughages are still conserved by old haymaking methods where a loss of 20 per cent of the dry matter appears to be about an average. In some rainy areas the loss is much greater.

New rules for feeding grain to dairy cattle are needed. Grain feeding schedules which do not permit the feeding of grain below 15 to 20 pounds of milk daily on dry feed do not take into consideration the low quality of the total digestible nutrients of hay and grass silage. The total digestible nutrient system of balancing rations does not take this into consideration.

Roughages are very low in true fat. Our work shows that alfalfa hay contains 0.5 to 1 per cent true fat. Unfortunately there is no correlation between the amounts of ether extract and true fat in roughages. The level of fat needed in the grain mixture has been investigated by several investigators. The Cornell workers have presented evidence which indicates that under controlled experimental procedure a level of

about 4 per cent fat in the grain mixture increases milk flow. In some of our experiments we have observed similar results. When practical mixtures based primarily on corn and oats were used, the results were negative. Similar results were reported by the Ohio Agricultural Experiment Station. Nevertheless, we need to know more about fat metabolism of cattle. For instance, we observed a drop in per cent of fat in milk when one pound of either corn oil, soybean oil or cottonseed oil was fed in one feed per day. Dr. Moore of the Maryland Agricultural Experiment Station showed that the heavy feeding of cod liver oil at one feed per day depressed the milk test while the same amount of oil fed every 2 hours had no effect on test.

The mineral content of roughages may vary markedly. This is especially true of phosphorus. As a rule, hay and silage crops are low in the element. There are several factors which influence the phosphorus level of roughages. Dry weather during the growing season results in low phosphorus herbage. Also on certain soil types, the available phosphorus may be low resulting in the production of low phosphorus hays. When the grain supplement contains a reasonable amount of mill feed by-products and protein concentrates, there is no need for the addition of bone meal or defluorinated phosphate.

In certain areas of the United States the roughages may be so low in cobalt, that a cobalt supplement is needed. The usual grains fed to dairy cattle are low in this element. A notable exception is linseed meal. Cobalt deficiency is indicated when the calves are not growing and show a lack of appetite for hay and grain. Older cattle are less subject to cobalt deficiency than calves. Affected animals usually have a craving for wood or hair. The response to cobalt administration is dramatic. We usually notice an increase in appetite on the third day after starting the treatment. The cobalt may be added to the calf starter by treating the salt with one ounce of cobalt sulfate mixed with 100 pounds of salt.

The elements sodium and chlorine found in common salt are present in very low concentrations in roughage grown in Michigan. The amount of salt usually added to commercial grain mixtures is adequate.

Most roughages furnish sufficient calcium, except where grass such as timothy is grown on very low calcium soils. Legumes supply sufficient amounts of this element.

Young pasture grasses are very high in carotene which is

changed into vitamin A by the animal. Consequently, cattle which have received good pasture through the summer go into the winter feeding period with a large reserve of vitamin A stored in their bodies. This means that from the standpoint of the health of cows, the roughages can be fairly low in carotene. When milk in vitamin A is desired, the only practical way of supplying it during the dry feeding period is through grass silage. We have read a lot about the need for vitamin A supplement for calf feeding. The results of a cooperative experiment between the Ohio and Michigan Experiment Stations indicate that a vitamin A supplement is of little value for calves which receive colostrum milk.

Hay as the mower cuts it down is devoid of vitamin D, the factor which is needed for bone development. During the curing process ultra violet radiation by the sun results in the production of vitamin D. Green roughages conserved in the silo and hay cured by the mow-drying methods are believed to be adequate sources of this vitamin during the winter months. Fortunately, a vitamin D supplement in the form of irradiated yeast is available at a very low cost.

Mold for a Haystack

A length of snow fencing makes a handy mold for chopped haystacks, Art Erickson, Audubon county, Iowa, has found. He joins the ends, then blows the hay straight down into the center of the circle formed. The feed is pulled to the outside with a fork and tramped down. When a layer 3 feet deep is packed in, the slatted mold is pulled up 1½ feet, and again filled to within 1 foot of the top. This continues until the stack reaches the desired height. Last summer he had 4 stacks of brome-alfalfa 15 feet high. Each was put up in a half day. The first 2 weeks stacks settled less than 18 inches.

Capper's Farmer

What About New Buildings?

Condensed from The Michigan Farmer

K. T. Wright
Farm Management Department, Michigan State College

FARMERS probably will spend more money for new buildings in 1947 than in any year in the past three decades. New building expenditures are expected to average about $80 per farm in the United States this year. Such an expenditure would be twice that of 1940. The prospective expenditures for new buildings this year are likely to exceed the previous peak of 1919. This does not necessarily mean, however, that more buildings will be built than ever before, as construction costs have reached an all time high.

Many farm buildings need repairs and some farms need new buildings. In deciding on the expenditure of money for remodeling or for the building of new buildings, farmers should consider the following four questions:

1. How do present and prospective costs of buildings compare with pre-war?

2. How much in the way of additional livestock products can be procured as a result of the new building or the remodeling?

3. How much will the new building or change add to the storage capacity, increase the likelihood of securing a better price, and contribute to an increase in farm income?

4. Will the change or addition improve labor efficiency or make the job easier?

These four questions "boil down" to one general question which is, "Is the expenditure justifiable on the basis of probable increased farm income, or increased operating efficiency?"

Let us examine the reasons why farmers have buildings on their farms. We are considering the farm buildings—not the house. One of the main purposes of having farm buildings on most farms is the housing of livestock. About one-half of the total crop production in the State of Michigan is sold, and the other half is fed to livestock. From the feeding of these crops, farmers approximately double their money, particularly with intensive enterprises such as dairy and poultry. This is another way of saying that livestock increase the gross

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income and generally the net income of a farm. Thus, buildings are needed to house the livestock necessary for fuller use of a farmer's feed and labor. It should not be necessary to point out, however, that the mere possession of buildings without full use of them by efficient livestock does not add to the net farm income. Buildings are also necessary for the shelter of machinery. Farmers also have buildings for the storage of feed crops which are used throughout the year, and for the storage of cash crops which they may not wish to sell at harvest time. A few farmers build some farm buildings to "keep up with the Joneses." Frequently this is not a money-making proposition.

Let us examine the nature of the investment of a farmer in his farm and note the relative importance of buildings in the overall picture. A more or less typical 200-acre central Michigan farm now has the following approximate inventory or investment. Bare land, about $12,000; farm buildings, $8,000; house, $4,000; machinery, $4,000; livestock, $4,000; and feed on hand at the beginning of the year, $3,000. On most farms the present value of the buildings is approximately equal to the value of the bare land. From the standpoint of total investment, buildings generally make up about 30 per cent of the grand total of the entire farm business.

Present construction costs are at an all time high. The index of prices of materials used in constructing buildings is approximately 75 per cent higher than it was in 1940. Lumber prices are almost double. Building material costs have risen nearly 25 per cent since last October. This pattern of increased cost at the present time is quite similar to developments during and following World War I. Following the 1920 peak in construction cost there was a relatively sharp decline the first year or two. This was followed by a slight increase for a few years, then a decline for about 10 years. By 1932 construction costs were approximately 40 per cent less than they were at the peak. While one would not want to predict that construction costs would follow exactly the same pattern this time, it does seem that a generally similar pattern will develop. Much depends, of course, upon the general economic situation.

There are 5 items in the cost of having a building: depreciation, interest on the investment, repairs, taxes, and insurance. Depreciation is usually figured at about 2 per cent a year, interest at 5 per cent and the other 3 items make up about 3 per cent a year. This means that there is

an annual charge equal to about 10 per cent of the value of a building for the year's use. For instance, the cost of using a $5,000 building would be approximately $500 a year.

Part of the decision as to whether or not a farmer should build a new farm building now depends upon how the construction will be financed. Does he have the cash or would he have to borrow the money? Many farmers have sufficient cash to pay for the proposed new building. And even though present construction costs are high, it will probably take fewer bushels of wheat and quantities of other farm products to pay for the building now than before the war. This is assuming that the savings are the results of high farm product prices and earnings during the war years.

If a farmer, however, does not have the cash to pay for the building and has to pay for it from future earnings, then he may have to use a larger quantity of farm products to pay for the building than under normal conditions. Suppose that a man borrowed $2,000 to build a $2,000 building and planned to pay off the loan in 5 years. The cost of paying off the loan and the annual cost of having the building would amount to $600 a year. Thus the man who does not have the cash to pay for the building should go slow in building at the present time, and give careful thought to whether or not the expenditure would be justifiable on the basis of increased farm income and increased operating efficiency. Even farmers who have cash to build now probably would find it much to their advantage to wait a year or two before building, unless there is an urgent need for the building from the standpoint of a better farm management program.

There is a temptation to overbuild when a person has ready cash, forgetting that the cost of building upkeep might be quite burdensome if farm income should decline.

What is the best use of the war time savings? Expenditures to improve the farm as a business concern, by increasing the size of operations, or efficiency of operation, should all be given careful thought.

One Failure in 8 Years

Condensed from Kansas Farmer

Ed Rupp

Did you get a good stand of alfalfa last fall? How did your sweet clover do this spring? If you weren't completely satisfied, maybe a different method of seeding would have produced better results.

Eight years ago Harold Koger, Sumner county, Kansas, was not satisfied with his legume seeding. To his way of thinking, the ordinary wheat drill was not intended for the job. So he built equipment of his own.

From experience Mr. Koger knew the field should be level and soil well packed to make a good seedbed for alfalfa. He also knew the seed would have a better chance to come up if covered, but must not be covered too deeply. On that basis he built his legume-seeding equipment.

First he found an old 8-foot tandem culti-packer. He paid $11 for it. This packer was old enough to tell a lot of stories. There was no company name on it. When it needed new wood boxings, Mr. Koger had them made. He could not find boxings in warehouses of present-day implement dealers that would fit his packer.

To complete his machine, he purchased a seeding attachment for $27 and mounted it above the leading packer. The seed drops ahead of the rear roller. The attachment was fitted with flexible tubes as guides for the seed but Mr. Koger removed them. In their place he installed a horizontal baffle board on which the seed falls and is sprayed over the ground. It gives a broadcast effect and, in Mr. Koger's mind, there is less opportunity for weeds to grow when the crop completely covers the ground.

The seeding attachment has 14 holes that are 7 inches apart. It gives a little better distribution of seed than a 12-hole attachment, with holes spaced every 8 inches.

That is the machine he has used for 8 years. It has been used on other farms, too. In fact, it has made the rounds in northeastern Sumner county. Mr. Koger recalls just one failure in that time. That year the weather was just too dry for a young stand of alfalfa to grow.

His luck with alfalfa, if you can call it luck, depends first on soil

Reprinted by permission from the Kansas Farmer, Topeka, Kansas, June 7, 1947

preparation, and finally on the seeding job he gets from his seeder-packer combination. For fall-seeded alfalfa he plows early in the summer and runs over the ground a couple of times with a tandem disk. He works the ground still more with a spring-tooth harrow and finally "floats" the field with a home-made drag. Floating a field is equal to 6 or 8 harrowings, Mr. Koger believes.

His float was made from 2- by 12-inch timbers. Two of these 20-foot timbers serve as runners. Two crosspieces between the timbers serve as the drags. They are set at opposite angles. The ground is dragged to one side of the float by the first angle plank, then released through a slot at the bottom. The ground is picked up by the second angle board and distributed over the area which it covers. The float levels the land and at the same time helps immensely to pack the soil, Mr. Koger points out.

He completes the floating late in August and is ready to seed alfalfa. He prefers to drop the seed into dry soil. He believes he gets best results that way. He does not wait for a light fall of rain before seeding.

As the seeder-packer goes over the ground, the first packer presses the soil down firmly and leaves shallow ridges and furrows behind it. The seed falls on this corrugated ground, much of it going into the small furrows. The second packer splits these ridges, giving a small cover and pressing the seed into the soil firmly.

Here is what happens: When the soil is packed, moisture tends to rise in the earth and it will not dry out rapidly. Seed sprouts without delay and makes a solid cover in a short time.

But what happens if the light fall rains happen to be clod busters? Mr. Koger cites his experience in the fall of 1945. Farmers well remember that fall when it began to rain early in September and delayed wheat sowing until late in fall.

Mr. Koger prepared 35 acres that summer for alfalfa. He plowed early, limed the field, tandem-disked twice and spring-toothed the field several times. After floating it, he was ready to seed. He put the small grains of alfalfa into dust early in September with his seeder-packer. The rains came. The first shower was light; only 1 to 1½ inches fell at first, he recalls. But in the next 10 days between 10 and 12 inches of rain fell. It certainly was a test of his legume-seeding method. But the alfalfa came through. The only place it failed was in some sandy spots where wind caused some blowing.

In sandy soil Mr. Koger seeds some oats with alfalfa in the fall. The oats come up first and tend

to prevent blowing. But in the fall of 1945, illogical as it may seem, the oats did not come through. Alfalfa did.

A well-packed seedbed does not dry out rapidly. At the same time packed soil will not run together as badly as loose soil when heavy rains come. Whether the weather turns wet or dry after seeding makes little difference. In either case the seeder-packer method seems to have an advantage.

Mr. Koger has used a single roller, dropping seed on the ground behind it. It has not worked satisfactorily for him. Rains tend to wash the seed around. Even with luck on weather, he says the single-roller method is not as certain as the tandem packer. Certain germination is what the farmer wants.

Mr. Koger has tried spring seeding of sweet clover in cornstalk and Sudan ground. After disking to loosen the surface, his seeder worked well there, too. He also is testing spring seeding of sweet clover in wheat and oats with the equipment.

The seeder attachment holds approximately one bushel of seed. It is large enough for legumes, but farmers would like a similar machine for seeding grasses, Mr. Koger points out.

Several seed-packers are now built by farm equipment manufacturers. International Harvester has a seed-packer which is recommended by the company for seeding grasses and legumes in fallow soil. Brillion Iron Works has developed a packer with wheels 2 inches apart. It has a box for legume seeding and another for seeding grasses like brome. The Brillion is jobbed by Deere and Company.

There are other companies, too, building seeder-packers. In any case the packer alone is a valuable tool. Combining it with a seeder attachment gives it a dual role. Seeding in this manner assures a larger percentage of germination, which means less seed can be used an acre with good results. It is removing much of the guesswork in legume seeding and saves high-priced seed.

Iceless Refrigerator Car

Condensed from Marketing Activities

H. D. Johnson and D. H. Rose

FROZEN foods must be stored and transported at near-zero temperature if they are to retain their prime quality. Tests recently concluded by the U. S. Department of Agriculture indicate that a newly developed refrigerator car is able to maintain a commodity temperature of approximately 0° F., even under conditions of summer heat. The ordinary refrigerator car, which uses ice and salt is unable to hold a temperature much below 15° F. Fan cars and overhead bunker cars can maintain temperatures substantially lower than 15° F., but not as low as 0° F.

The refrigeration system used in the experimental car is a new application of an old principle. The refrigerant—liquid anhydrous ammonia— is contained in receiving tanks with a capacity of 1,900 pounds. The flow of ammonia to the expansion (cooling) coils located in the ceiling of the car is controlled by a bulb-type temperature - control apparatus with a range of from 5° F to 65° F. After passing through a surge tank and expanding at low pressure in the cooling coils, the ammonia passes into the absorber tanks where it is taken up by water. These tanks have a capacity of approximately 750 gallons of water. The tanks are usually charged with only 500 gallons, however, to allow for expansion as the ammonia enters. Both the ammonia and water tanks are suspended under the car with a clearance well within the limits established by the Association of American Railroads. The refrigeration system has no moving parts and hence no power requirements.

The car itself has a total loading capacity of 1,938 cubic feet. Insulation specifications for side and end walls call for two 1½ inch layers of Naturezone, with a 2-inch air space between the layers; two layers of Silvercote over the outside layer of Naturezone, and one layer inside the inside layer of Naturezone. The floor is covered with 2 inches of Naturezone with ½ in of Celotex; the roof with 4½ inches of Haircraft. The car was built by the North American Car Corporation.

To determine the efficiency of the car in actual operation, the Frigid Transport corporation, patentees of the refrigeration system and the Birds Eye-Snyder Division of General Foods

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Corporation requested the U. S. Department of Agriculture to conduct tests.

On February 10, 1947, the car was loaded at Jersey City, N. J., with frozen tangerine segments furnished by the Birds Eye-Snyder Division. The car moved from Jersey City to Alexandria, Va., where it was put in a test house owned by the Fruit Growers Express Company. To simulate hot weather conditions, the air in the test house and surrounding the refrigerator car was maintained continuously at around 92° F. The car was returned to Jersey City on February 24.

Thermometers were placed in various positions throughout the car at the time of loading and additional thermometers were installed during the period the car was in the test house. Temperature readings were taken at Jersey City, Baltimore, and upon arrival at Alexandria. Thereafter readings of temperature of air and commodity inside the car, and air outside the car in the test house, were made at intervals of 2 hours throughout the 10-day period the test was conducted.

The results of the car testing experiment showed that, under conditions of this test, the average top commodity temperatures ranged from 4° F. to nearly 1° F.; the bottom commodity temperature ranged from about —3° F. to about 3° F. (Improved wall and floor racks, allowing a freer circulation of air, would undoubtedly narrow the spread between temperatures at the top of the load and those at the bottom of the load. The tangerine segments were frozen when they were loaded in the car; they were still hard frozen when they were unloaded.

From the time the test started on February 10 until it ended on February 21, the ammonia-consumption rate was 41.98 pounds per hour. During one 46-hour period that elapsed between rechargings the rate was 45.45 pounds per hour.

Inasmuch as the test house was not equipped to handle water under pressure or liquid ammonia, the improvised method of charging took longer than would be required at a "service station" equipped for that purpose. It should also be mentioned that when the absorption tanks were drained, the ammonia-charged water was discarded, whereas, with proper equipment, the ammonia could be recovered by distillation and used again.

(Names of commercial firms and products are mentioned in this article. This does not imply endorsement of the firms or products by the U. S. Department of Agriculture.—Editor's note).

Baby Pig Disease Might Be Helped with Milk Syrup

Condensed from The Western Farm Life

BABY pig losses ran high this past spring and part of the losses were the direct result of hypoglycemia or "baby pig disease." The malady was highly fatal and the new-born pigs usually died within 24 to 72 hours after the first symptoms appeared. These symptoms included shivering, dullness and lack of desire to nurse. The pigs also had a tendency to wander away from the sow and their litter mates and burrow under bedding. When disturbed, the affected pigs squealed. Their hair stood upright, their skin was cold and they finally lapsed into a coma.

During the first 72 to 90 hours it is advisable to watch new-born pigs closely for such symptoms as loss of appetite, rough hair coats, loss of vigor and poor conditon," according to Clifford Iversan, of South Dakota Agricultural College, at Brookings. "If pigs do develop these symptoms in future litters, they should be taken away from the sow, hand-fed and cared for so they won't get chilled," he explains.

The pigs should be fed corn syrup diluted with an equal amount of warm water at the rate of 1 to 2 teaspoonfuls every 2 or 3 hours for a 24-hour period. Later when the pigs' appetites improve, a modified cow's milk solution may be used. This can be made by mixing 2 quarts of whole milk, the white of an egg, 3 ounces of cream and 3 ounces of lime water and heating to 100 degrees Fahrenheit before being fed.

The exact amount of the syrup or milk to give the pigs will depend on their age, vigor and appetite. Too much may cause scours, Iverson warns. After several hand feedings, it may be advisable to take the pigs back to the sow for nursing if she is giving sufficient milk and the udder is not affected with mastitis.

Pigs should not be hand-fed after they are 4 to 5 days old. They can be given cow's milk or a mixture of whole milk and skimmed milk from a shallow pan or trough. Clean the trough before each feeding.

Although a high percentage of pigs on a farm may be affected the disease is not contagious, Iverson explains. The exact cause

Reprinted by permission from the Western Farm Life, Denver, Colorado, May 15, 1947

weeks of pregnancy may be one of the causes for this condition in the litters. Losses can be greatly reduced by feeding the sows a liberal well-balanced grain ration particularly during the last few weeks of gestation.

of this condition is not known but it appears to be associated with a reduction in the normal milk flow of the sow.

This would mean that the amount of feed consumed by the sows or gilts during the last few

Bran Replaces Litter with Radiant Heat

Condensed from New Jersey Farm and Garden

William A. Haffert, Sr.

BRAN in place of litter is being used successfully at the Eshelman Red Rose Farm, Lancaster, Pa., in its brooderless (radiant heated) brooding house.

"Up until the last two hatches," said farm manager Jacob Souder, "we used crushed peanut hulls. We found that the chicks ate much of the litter instead of eating as much feed as they should so we changed over to a thin sprinkling of bran over the concrete floor, with no litter at all. The chicks eat almost all of the bran, and we find that no litter whatever is needed. The bran is used at the rate of 100 pounds to 1,800 square feet of floor space."

I visited the Eshelman farm just as 16,000 day-old chicks had been put in the big radiant heated two-story brooder house. The day was raw, and outside temperature was 49 degrees. Inside the house, at the ceiling, the temperature was 74 degrees, and at the floor it was 95 to 98 degrees, depending on whether the thermometer was on a "hot" or 'cool" spot. Water temperature, at the heater, is 125 degrees. Hot spots are those, according to Souder, where the hot water from the heating boilers first circulates through the floor pipes. The return pipes are naturally a bit cooler, making a difference of about three degrees in various parts of the floor.

"This is all to the good," said Souder, "because the chicks can have a free choice of a warmer or cooler spot."

Reprinted by permission from N. J. Farm and Garden, Sea Isle City, N. J., June, 1947

Destruction in the Dark

Philip Ferry

Few sections of the country are free of the depredations of the destructive termite. Termites are no half-hearted public enemy. Once they gain a foothold, they will completely undermine a structure, growing fat, and rearing a large brood while doing so. They are difficult to detect since they live and work in the dark. If they find it necessary to appear above ground in order to reach edible wood, they protect themselves against their mortal enemies, the ants and spiders, by constructing pipe-like passageways of sand in which they pass unseen between hiding place and food supply.

Despite their destructive tendencies and the problems they pose for our Public Health authorities, termites are exceedingly interesting creatures. For biological interest, their life story rivals that of the bee and the ant. They seem originally to have been scavengers whose chief mission was ridding the forest floor of fallen tree matter. Since the forest with its concealing coverage is fast following the buffalo into the realm of memory, the termites have adapted themselves to an urban way of life and are carrying on their wood-consuming instincts by preying on man-made structures.

The termite's sole purpose in attacking wood is to extract the cellulose, the main ingredient of the membranous walls of plants and trees, and the substance upon which they live. The quest for cellulose leads them to attack floors, beams, furniture, poles, lumber, railroad ties, tanks and other structures in which their presence may not be suspected until only a shell remains. A termite is a miniature chemical laboratory with a digestive tract which converts wood cellulose into sugar. Anyone who could duplicate this process of economical conversion could quickly become a millionnaire since he would need only to transform the debris on the forest floor into sugar—a modification of the age-old philosopher's dream of changing base metals into gold.

The termite is one of the few creatures that can assimilate cellulose. The ability to absorb this substance is a problem in chemistry and biology. The termite has a minute inner organism which converts the cellulose into sugar. As somebody expressed it: "Termites live on wood but they cannot digest it." This is

true enough. They have within their intestines one-celled protozoa or flagellates which change the wood into sugar, in which form the termites readily digest the foundation of your house.

There are many species of termites throughout the world, the most conspicuous being those which build the erroneously named "ant" hills of the west coast of Africa. The termites we know are soft-boiled, creamy-white insects which bear a superficial resemblance to ants, a fact that has led to their being called white ants. Actually, they are not ants at all, although they resemble the ants in their social habits, building "hills" and living in large communities below the surface of the ground, or in basements or other concealed situations.

A termite colony is a highly organized and complex society whose members are divided into three main castes consisting of soldiers, workers, and reproductives. The soldiers are large-headed, strong-jawed individuals who will fight to the death to defend the colony against its natural enemies, the ants and spiders. The workers are the most numerous caste, consisting of blind and sexless members who collect food, dig tunnels and care for the eggs and the young. They are the bad actors of the lot, their powerful jaws accounting for the gnawing away of an estimated $50,000,000 worth of property each year.

On the male and female reproductives rests the perpetuating of the species. Each couple forms what is known as a royal pair, the female being termed the queen, the male the king. These newly organized family groups proceed to make homes for themselves and establish new colonies under dead vegetation, under boards and, since moisture is essential to the life of some (not all) species, below the surface of the ground. These underground establishments are of several stories and many chambers. Some house the workers, one houses the king and queen, another the eggs and young. Still others are used for storing supplies, although termites store up little food, preferring to forage the year round.

With impregnation, the queen undergoes a fantastic alteration, becoming enormously distended with eggs and swelling to a length of more than two inches, in contrast to a former length of one-quarter inch. In this swollen condition she is a prisoner in her own cell, becoming a monstrous egg-laying mechanism which spawns eggs at the incredible rate of 75,000 daily. In spring the young winged females swarm into the open to mate, the survivors becoming

the imprisoned "rulers" and founders of new colonies. Fortunately for man, not all succeed in establishing colonies; if they did, their numbers would destroy faster than man could rebuild.

For a couple of weeks the new born nymphs are fed regurgitated food by the worker termites. In this manner protozoa (without which termites cannot digest food) are transferred from generation to generation. Soon the young nymphs (which develop into the three castes already mentioned, much as in a colony of bees), begin to feed on wood. Thus the wood-riddling instinct is the first to manifest itself in the young, although if need be, they will feed on a variety of materials including waste matter, dead comrades, and the decayed portions of plants. In their efforts to reach edible wood they will work their way through mortar joints in brick walls, and through porous or cracked concrete. Having established a runway, they travel back and forth by the thousands between food and the ground.

Still and all, the case is not altogether hopeless. Without in any way minimizing the damage that may result from the presence of termites, it is a fact that in the more temperate zones termite attacks may go on for years without involving the need for extensive repairs. Moreover, there are thousands of operators in business employing any number of methods for the control of termites. These range from the expensive procedure of reconstructing the foundation of a building in order to block off all termite movement and thus starve out the insects; to that of using a new and effective deterrent recently devised by science and consisting of a kerosene solution containing five per cent of the wonder insecticide, DDT.

It is frequently asked why termites have gained such prominence in recent years. The answer would seem to be that though the voracious creatures have existed in their present form for millions of years, their depredations were formerly attributed to dry- and damp-rot. When the real source of the evil was revealed, the blame was laid where it belonged —squarely on the indefatigible mandibles of Mr. Genus Termes, a living chemical factory through whose insatiable mechanism passes a steady stream of cellulose-charged wood.

The Effect of Rotation Grazing Upon Bromegrass Alfalfa Pasture Yields

Condensed from Sheep Breeder

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It is the hope and aim of the livestockman to have a pasture that will furnish an abundance of palatable forage for continuous grazing from spring until fall. It is a common experience to witness an abundance of forage from the middle of April until the middle or last of June when there is likely to be a drastic reduction in the number of livestock units the pasture will carry. Because of the nature of the livestock enterprise, the animal units cannot be increased at will to meet the seasonal changes in the carrying capacity of the pastures. In general, the livestock units per acre of pasture must be based upon the periods of lowest carrying capacity.

The practice of rotation grazing was used at the Nebraska Agricultural Experiment Station to study its effect upon the productivity of a bromegrass-alfalfa pasture, its ability to furnish more pasture days of grazing and its possibilities of furnishing continuous grazing days through the summer. Two plans were used for measuring pasture yields. One measured the tons of oven-dried vegetation produced per acre by using the wire cage and grass clipping method. This method also was used to determine how well the forage was utilized by sheep. The other plan measured pasture yields by the number of sheep-pasture-hours of grazing produced during the grazing season.

Two new broomegrass-alfalfa pastures of about two acres each, and comparable in topography, were established in 1939 and first used for grazing in 1940. One of the pastures was cross-fenced to make three equal areas for rotation grazing. The other pasture was used for a check lot which allowed the sheep to use any part of the pasture at their will.

Reprinted by permission from the Sheep Breeder, Chicago, Ill., June, 1947

The plan used for rotation grazing is more easily explained by naming the three cross-fenced areas A, B, and C. For example, if the sheep were started the first year on pasture A, they would rotate from A to B to C and back to A. The rainfall determined the number of cycles completed but the rate of rotation would be managed so that when the grazing for the season started in A the season would close in B. The second year the grazing would begin in C and close in A. The third year the grazing would begin in C and close in A. The plan allowed a good fall growth of vegetation, at killing frost time, in the pasture to be grazed first next spring. The sheep were not rotated at regular intervals. They were allowed to graze until a good coverage of about 3 to 4 inches of forage was left before moving to the next pasture in the rotation.

Sheep from the purebred flocks of the University of Nebraska were used to graze the pastures. Usually the sheep for grazing represented more than one breed. Some years ewes and lambs were used, other years yearling ewes and yearling rams were used. When the two groups of sheep for grazing were not uniform for size, age, sex and breed then the groups were alternated on the pastures. The sheep grazing in the rotation pastures one day would be grazed the next day in non-rotatioin pasture and vice versa for the other group of sheep. Two lambs were counted as being equal to one yearling or mature sheep. This perhaps was over-estimating the grazing ability of lambs when first turned on pasture and under-estimating their grazing ability after weaning.

A complete record was kept for every 15 minutes the pastures were being grazed. They show the time a specific group of sheep was turned into the pasture and the time the sheep were removed. Three kinds of pasture hours were recognized, (1) day pasture hours which would be grazing the pasture any hours between morning chores and evening chores, (2) night pasture-hours which would be grazing the pasture any hours between evening chores and morning chores, and (3) day and night pasture-hours which would be from morning to morning chores or from evening to evening chores. The two pastures were subjected to the same kind of pasture-hour usage at the same time within reasonable limits.

The sheep were turned into the pastures about April 10 to April 20, depending upon the season. At this time the forage would be about 6 to 8 inches tall. The pasture for rotation grazing was used as a standard to deter-

mine the number of sheep to use per acre. For example, if the rotation grazing started with pasture A, enough sheep were used so that pastures A and B would be grazed but still leaving a good cover of forage on each by the time the bromegrass in pasture C was beginning to head profusely. The rate of grazing was increased or decreased by adding or removing sheep. The same changes were always made for the non-rotation-grazing lot as for the rotation-grazing lot of sheep.

The Agronomic data collected the first year, 1939, are for a season of limited grazing because the pastures were being established. The yield of oven-dried bromegrass in tons per acre for the non-rotation-grazed pasture and for the rotation-grazed pasture for 1939 were .66 and .41 ton respectively; for 1940, 1.49 and .80 ton; for 1941, 1.89 and 1.85 tons; for 1942, 3.24 and 3.12 tons; and for 1943, 1.62 and 1.66 tons. The yields in 1941 and 1942 are peaks more or less expected in newly-established pastures. It no doubt was influenced considerably by the generous rainfall and very favorable temperatures experienced those years.

Alfalfa yields in tons of oven-dried forage per acre for the non-rotation-grazed pasture and the rotation-grazed pasture for 1939 were .88 and .31 ton respectively; for 1940, 1.18 and 1.40 tons; for 1941, 1.36 and 2.92 tons; for 1942, .78 and 1.64 tons; and for 1943, .07 and .69 ton. A comparison of the first year and the fifth year of production is very striking. The non-rotation-grazed pasture the first year produced approximately three times as much oven-dried alfalfa as the pasture that was rotation grazed. The comparative yields were the reverse for each of the following years with the rotation-grazed pasture producing approximately 10 times as much oven-dried alfalfa as the non-rotation-grazed pasture.

The yield of weeds during the five-year pasture study cannot be overlooked. The first year the rotation-grazed pasture produced .42 ton of oven-dried weeds or almost twice as much as the non-rotation-grazed pasture. The third, 1941, weed yields were so small in both pastures it could not be measured with any degree of satisfaction. In 1943, the fifth year of the pasture comparison, the non-rotation-grazed pasture was yielding .32 ton oven-dried weeds or approximately 16 times as much oven-dried weeds as the rotation-grazed pasture.

The pastures were grazed very lightly for a limited time the first year, 1939, while they were being established. The use of the pastures was so small that the data

collected will not be reported at this time. The two pastures received the same treatment.

For approximately the first month of each grazing season the mature sheep were allowed access to dry roughage in a dry lot at night. If ewes and lambs were being grazed they received some grain morning and evening in addition to the dry roughage. As the pasture became more abundant the grain was gradually removed from the ewe ration but grain was always a part of the lamb ration.

The second year, 1940, sheep were started in the non-ration-grazed pasture and the rotation-grazed pasture April 22 at the rate of 6.25 sheep per acre.

The rate was increased May 20 to about 9.5 sheep per acre and remained at this rate until July 1, when pasturing was stopped in the non-rotation-grazed pasture because of inadequate forage growth. Pasture use continued in the rotation-grazed pasture until July 22, but the sheep grazed per acre was reduced from 9.6 to 5.6 head per acre. The non-rotation-grazed pasture failed to furnish pasture from July 1 to August 12 or 6 weeks. The rotation-grazed pasture failed from July 22 to August 12 or 3 weeks. Both pastures furnished about the same pasture hours from August 12 to September 22, the closing date for the pasture season. The grazing rate for this period was about 12.5 sheep per acre.

The pasture season for 1941 started April 23 with about 9 sheep per acre for the first two weeks. From May 15 until July 7, when the forage in the non-rotation pasture was insufficient for further grazing, the carrying capacity was about 12.5 sheep per acre. The rotation-grazed pasture continued with about 10 sheep per acre until August 11 when the number was reduced to 8 per acre until the close of the pasture season September 21. The non-rotation-grazed pasture carried about 10.25 sheep per acre from August 18 to September 21. It failed to furnish pasture for six weeks, July 7 to August 18, while the rotation-grazed pasture was carrying better than 10 sheep per acre for the same time.

The 1942 pasture season started April 20 with 11.3 sheep per acre until May 11 when the number was changed to 27 sheep per acre during day grazing, and 16 sheep per acre for day and night grazing. This continued until June 29 when the rate was changed to 20 sheep per acre with day and night grazing only. The week of July 13 the non-rotation-grazed pasture dropped rapidly in productivity, so much so that the sheep were removed July 20 and the pasture was not used again for three weeks of

August 10. At this time, it was grazed at the rate of 4.25 sheep per acre until August 24 and from then until September 20, the close of the pasture season, at a rate of about 18.7 sheep per acre. The rotation-grazed pasture furnished continuous grazing for the season and carried about 11 sheep per acre day and night grazing, from July 20 to September 20.

The 1943 grazing season started April 13 with about 16 sheep per acre. The number was reduced to 13.3 May 17 for the non-rotation-grazed pasture until July 15 when the sheep were removed for 4 weeks because of no pasture. On August 9 it was decided to abandon the non-rotation-grazed pasture because of its low productivity and get it ready for renovation. Sheep at the rate of 52 per acre were turned in to clean off the weeds. The rotation-grazed pasture furnished continuous grazing with 16 sheep per acre from April 13 to August 9 and from then until the end of the pasture season, September 6, at the rate of about 14 sheep per acre.

The non-rotation-grazed pasture was not used in 1944. It produced very little in 1945 and furnished about 6 weeks of grazing in 1946. The rotation-grazed pasture furnished good continuous grazing from spring until fall in 1944 and 1945. It would have furnished good continuous grazing in 1946 with reasonable use. It was carrying about 35 sheep per acre in the spring which made too fast a rotation for the sudden early summer dry spell that required resting the pasture for about 10 days. The alfalfa stand is still excellent. The weeds are not increasing. The pasture will be rotation grazed in 1947.

New Bindweed Control Method

Condensed from Cappers Farmer

THE new way to kill bindweed is with sheep. Main outlay for the man who owns a flock will be for plowing the field 4 times and cost of seed for two crops of rye and two crops of Sudan. Sheep may do the job in shorter time than is required by tillage. The old way took two years, required 15 to 20 costly cultivations, and two crops were lost. The weeds give up for the same reason in both cases—because the root system is starved.

The pasture method of eradication was developed at Lamberton station in Minnesota. Heavily infested land plowed September 15 was seeded to rye. Plots were grazed May 1 to June 20, when they were plowed and put to Sudan which was grazed until September. Ground then was tilled and put back to rye to be handled as in the previous year. After the second year's Sudan was ready to graze no bindweed plants could be found. The kill had been completed in 1½ summers of grazing!

The rye and Sudan were managed to maintain several inches of top growth. That produced partial shade for vines and helped to weaken them.

No records were kept to show how many days of grazing were provided or how many pounds of mutton were produced an acre. Clippings taken showed a year's yield of rye and Sudan, dry basis, ranged from 2 to 4.4 tons an acre. The yield was well above that of well-established bluegrass pasture and feeding value was higher. Protein content of grazed material was: Rye, 27.1 per cent; Sudan, 23.5 per cent; bluegrass, 20.5. The yield and the high feeding value suggest that mutton and wool, at present price levels, ought to pay all costs of destroying stands.

Farmers long have known that bindweed was grazed readily by sheep when pasture mixtures were seeded on infested land. But when they tried to graze it to death in such a mix they failed. If it and other weed growth only were available, bindweed remained thrifty longer than the sheep. Reasons for these failures were brought out in other phases of the Lamberton tests.

Alfalfa-brome and alfalfa-canary grass mixtures on bindweed land were grazed May 20 to September 30. They produced heavy yields of high-protein feed, but 25 per cent of the bindweed remained.

Reprinted by permission from Cappers Farmer, Topeka, Kansas, April, 1947

On another plot no crop was seeded and an attempt was made to kill bindweed by heavy grazing. Plants never were permitted to get more than 4 inches long. By this method the stand was reduced only 53 per cent in 4 years.

When sheep had a choice of pure stands of bindweed or the rye-Sudan combination, they hardly touched the bindweed. In contrast, in the seeded crops, they ate the weed in preference to rye or Sudan.

Alfalfa, brome and bindweed were eaten evenly, with the sheep showing no preference. It is not clear whether this was because the stand was so dense they could not go to the ground to clip off bindweed or whether the brome and legume were more palatable than rye. In the alfalfa-canary grass mix, the grass proved unpalatable and the alfalfa was grazed so hard that it was killed before the bindweed stand was affected.

Winter wheat, as well as rye, was tried for the spring pasture crop. It yielded about as much feed as rye but it was not as winter hardy for Minnesota. The wheat was not as palatable as rye. That might cause sheep to graze bindweed more closely.

Wheat and rye harvested as grain proved no check for bindweed, even when the ground was kept black from harvest to seeding. The stand thickened under such treatment. Alfalfa-grass mixtures harvested for hay also showed heavier infestation at the end of the test than at the beginning.

Tests will be required to show whether these methods will work in other areas as they did in Minnesota. Obviously there are questions yet to be answered. What variation will be necessary when the weather is too dry to germinate Sudan? What about prussic acid poisoning when heat and drouth stunt young Sudan? In such cases tillage might substitute for the grazing crop. Until these and other questions are answered, farmers who try the method should proceed cautiously.

Farming in the Land of the Rising Sun

Condensed from New England Homestead

Nathan Koenig

Executive Assistant to Secretary of Agriculture, Clinton P. Anderson

THAT 2½-acre lot off the side of your barn is just about as big as the average farm in Japan. From this much land the average Japanese farmer has to feed himself and his family and — in addition — produce some surplus to help feed the people who live in the towns and cities. The average Japanese farmer, moreover, has to eke a living out of this much soil with virtually nothing more than bare hands and crude implements.

An American visiting the Far East for the first time is readily shocked by these conditions. He comes to realize that the oriental farmer is indeed fortunate if he has a wife who can help with the plowing or with pulling a well-loaded two-wheel cart. If the farmer has an ox or cow, a water buffalo, or any kind of horse, for his plowing and hauling, he is not only fortunate but is regarded as one of the "wealthy" class. Actually, only a few farmers are so blessed as to own an animal which can serve in any way as a beast of burden.

The small size of the average farm in itself places a limit on the use of animal power. The oriental farmer tries first of all to be self-sufficient in his food supply, and few farmers have enough extra land available to produce the feed that would be needed by a draft animal. The result is that most of the plowing and cultivating and hauling has to be done by human labor.

In Japan, as in practically all of the Far East, getting enough food just to survive is the number one problem of practically everyone. For decades Japan has never been self-sufficient in food. And there is no prospect in the foreseeable future of Japan's being able to produce all the food it needs for itself, even though slightly more than 40% of Japan's population are farmers who produce all or most of their own food supply. The reason for this is simple: There are too many people on too little land suitable for farming.

During the last 65 years the population of Japan has doubled. It now totals 77 million persons and it is increasing at the rate of about a million a year. This population—more than half of the

Reprinted by permission from New England Homestead, Springfield, Mass., June 14, 1947

United States—Japan now has to support on an area slightly smaller than the State of California. To add to the complications created by this limited land area, only about 16% of the total land area is fit for crop production. Thus Japan has a population density of about 3,000 persons per square mile of arable land. This compares with 800 to 900 in Italy and Germany, and with about 2,400 in highly industrialized Great Britain.

With too many people on too little land, Japan—like so many other old countries—has to resort to a highly intensified type of agriculture. Among the crops, greatest reliance is placed on grains and cereals for direct consumption as human food. In Japan, as in other parts of the Orient, rice is the staple item of diet. On the average it represents from a half to two-thirds of the food consumed. Other staple food items—consumed in varying amounts in different parts of Japan, depending on local conditions for the various crops and the season of the year—are wheat, barley, naked barley, sweet potatoes, and white potatoes.

From this it is apparent that the Japanese diet is greatly deficient in protein. The main sources of protein for the Japanese are fish, soybeans, and other beans. Soybeans are grown locally in only relatively small quantities, and in the past as much as three-quarters of the quantities consumed have been imported. Fish holds first place as a source of protein at the present time. Because of war-time destruction of the Japanese fishing fleet and consequent shortages of nets, fuel and small craft, the production of fish in Japan is far below that required to make up the protein deficit. The problem of increasing the fish catch is made more difficult by the severe restrictions that have been placed on the areas where the Japanese are permitted to fish.

In the best of times before the war the Japanese were able to meet only 85% of their food requirements out of their own production of crops and fish. Normal imports of food ranged from three to five million tons a year. Such imports included rice, soybeans, and other beans, sugar, some wheat, flours and starches, and oil-yielding seeds and materials. Imports of rice alone totaled from one and a quarter million tons to two million tons a year, depending upon how the crop in Japan turned out.

Up to the end of the war, the areas from which Japan made up the biggest part of its food deficit were Korea, Formosa and Manchuria. These areas were under Japanese domination for a

long time and—in so far as Japan was concerned—they existed primarily for the purpose of bolstering the Japanese economy. With the end of the war Japan lost control of these important adjuncts. No longer can Japan reach into these areas and take out food and other essentials needed to make up the deficit of the Japanese people. If food imports are to be obtained from Korea, Formosa, or Manchuria, Japan must now be in a position to pay for them. This also applies to imports from other countries. This means, in brief, that Japan must in some way develop foreign exchange. Until that time arrives, the United States—as the occupying power—must supply at least the bare necessities of food and other materials needed to maintain order and to help restore the Japanese economy to a point where it can pay its own way.

So far the deficit between domestic production and minimum requirements has been made up out of shipments of food, mostly grain, from the United States. During the first year of the occupation, food imports totaled slightly more than 700,000 tons. For the current fiscal year (ending June 30, 1947) food shipments from the United States to Japan will approximate twice this amount.

Since Japan cannot—for the time being, at least—pay for imports, the cost of the food shipped from the United States has to be borne by the American taxpayer. How long this expense will continue depends upon the speed with which Japanese industry is restored so as to make exports possible. Some progress is being made in reviving industrial activity in Japan but at best is going to be a slow-going and difficult job.

Meanwhile the United States occupation forces are faced with the job of holding to a minimum the cost to the American taxpayer of the food imported into Japan. This can be done by encouraging maximum production on Japan's limited arable land areas, and by making certain that staple foods produced in excess of the minimum quantities allowed for consumption by farm families are delivered under the collection program and are equitably distributed to the non-farm population.

One major handicap to getting more food produced in Japan is the acute shortage of fertilizer, especially nitrogen. This is a difficulty that besets most of the agricultural producing areas in a large part of the Orient, where—as in Europe—soil fertility has been sapped both by long years of intensive cropping and by wartime conditions.

For the most part the agri-

cultural land in Japan is not very productive. Much of it is volcanic ash and provides only anchorage for roots. It is made productive by the heavy use of various kinds of fertilizing materials—anything from compost and animal and human wastage to commercial fertilizers.

Before the war Japan had a very substantial fertilizer producing industry. Much of it, however, was heavily damaged during the war. An aggressive program of repairing plants and restoring fertilizer poduction has been undertaken. Considerable progress has already been made, and at present Japan is able to produce about two-thirds of the fertilizer required. A shortage of electric power, due mainly to coal production far short of needs, is limiting the operation of plants that produce nitrogen.

In order to help meet at least part of Japan's nitrogen deficit, nitrogenous materials produced in Army-operated plants have been shipped from the United States. The shipment of this nitrogen is saving on shipments of food from the United States, and in this way is reducing costs to the American taxpayer, since experts estimate that one ton of nitrogen is the equivalent of from 10 to 12 tons of rice.

Japan is also short of phosphorous and potash, having no natural deposits of either of these materials. Potash is imported from Germany, while rock phosphate is brought in from various areas, including the United States, and processed into phosphorous in Japanese plants.

By nature the Japanese farmer is an industrious and conservative individual. Having so little to work with, he cannot afford to tolerate waste on his farm. Despite shortages of commercial fertilizer, tools, insecticides and other farming essentials, the Japanese farmer has done a reasonably good job in getting food produced.

Cover Crops Help Save Soil

Condensed from Iowa Farm Science

H. A. Wilson, G. M. Browning and J. B. Peterson

STUDIES show that it would pay Iowa farmers to use more cover crops in corn and perhaps other row crops. And here are the reasons:

1. They cover the soil from August to May. This is when one fourth of the annual soil losses occur.

2. They add organic matter to the soil. This gives it greater resistance to erosion in May and June. This is the time when one-half of our annual soil losses occur.

4. They add green material containing nitrogen. The cover crop should contain legumes. These will add 30 to 60 pounds of nitrogen to overcropped land if inoculated and grown on sweet soil. The cover crop is green when plowed down. It is easily decomposed and so the nitrogen is soon ready for the plants to use.

4. A cover crop increases the yield of corn that follows only slightly. But the increases may be expected to get larger as more organic matter and nitrogen are added with cover crops. Anything which increases nitrogen in the soil, reduces soil and water losses and improves soil structure should increase yields.

If you seed the cover crop at the last cultivation of corn, the results will be almost as good as seeding later. Just before "laying by the corn" broadcast the seed with an endgate seeder. Several farmers have reported good results by another method. They mount a seeder on their cultivator at the last cultivation of corn. Weeders are attached to follow the cultivator and these cover the seed. You can expect better stands and growth if you cover the seed.

Ordinarily you will have fewer failures and better growth in Iowa if you seed the cover crop during August. Our seedings have been successful about 3 out of 4 years when seeded at this time. Failures have been largely due to insects eating the young seedlings and to hot, dry weather following seedings.

Seeding during August makes it a separate job. It requires the use of a one-horse grain drill. Most farmers do not have such a drill—sometimes not even a horse. Neither is it pleasant to be in the tall corn on a hot after-

Reprinted from Iowa Farm Science, Ames, Iowa, May, 1947

noon with the ears bumping you in the face and the leaves cutting your neck.

We have tried cover crops on some 23 farms during the last few years. These farms have been located in 12 different countries. This work has been done by the Iowa Agricultural Experiment Station, cooperating with Soil Conservation Experimental Many seedings during the last 15 years have been made at the the Soil Conservation Service. Farm in Page County. Experiments have also been made at the Agronomy Farm, Ames.

We have used oats, wheat, rye, domestic ryegrass, sweetclover and vetch for cover crops. We have also mixed oats and vetch together and rye and vetch.

The rate of seeding per acre has been above the standard recommendations for ordinary seedings. Sweetclover has been seeded at the rate of 15 pounds per acre; rye, 5 pecks per acre, and vetch, 2 pecks. Rye and vetch together have been seeded at the rate of 5 pecks per acre. This mixture is a bushel of rye and 20 pounds of vetch.

From our tests we believe that sweetclover or rye and vetch together offer more possibilities as cover crops in Iowa than any of the others tried. In western Iowa rye and vetch make excellent growth if the soil is moist. The sweetclover failures in western Iowa have been due to not enough moisture or to the seedlings being eaten by insects.

Table 1. Yield of dry matter (tops and roots) and the moisture of the soil under cover crops planted in soybeans, Marshall silt loam, Soil Conservation Experimental Farm, Page County, Iowa.

	Date seeded in 1944	Yield—tons per acre tops		Dry matter roots (0-3")	Soil Moisture (percent)	
		Sampled 4/26/45	Sampled 5/4/45	Sampled 5/4/45	Sampled 4/26/45	Sampled 5/4/45
Rye-Vetch	7/28	1.65	1.79	0.28	16.2	13.3
Rye-Vetch	9/2	1.47	1.82	0.28	16.2	13.0
Oats-Vetch	7/28	——	0.95	0.25	——	13.0
Oats-Vetch	9/2	1.12	1.11	0.27	18.4	12.7
Check*	——	——	——	——	16.5	15.9

*Samples taken from areas adjacent to the cover crop plots.

An oats and vetch mixture in the fall grows as well as the rye and vetch mixture. The first heavy frost, however, kills the oats. This would be all right but the stand of vetch is not heavy enough to cover the ground well when growth starts the following spring.

If you seed cover crops in late August they'll produce from 1.0 to 1.5 tons of dry matter by the following May. This is top growth. In addition there will be about 600 pounds of roots, or a total of about 1.5 tons of organic matter will be added to the soil. Table 1 shows the organic matter produced by cover crops planted in soybeans in western Iowa.

Table 1 also shows that rye and vetch use up soil moisture. The soil moisture was lowered from 16 per cent to 13 per cent in one week under cover crops. These plants grow fast during the warm spring days. If you let the plants grow too late in the spring they'll take so much moisture that there may not be enough left to germinate the corn unless you get rain. We recommend plowing down the cover crop by the last of April or the first of May.

We found more nitrogen under corn in July following a cover crop than under corn where no cover crop had been grown. Sometimes if rye and vetch is not plowed down before the rye heads, the corn will suffer from too little nitrogen. This is because the nitrogen in the soil is being used by the bacteria and fungi which are decomposing the cover crop. A good plan to follow is to plow under the rye and vetch before the rye heads and at least a week or ten days before you plant corn. This gives time for some of the organic matter to be decomposed.

Row crops which require cultivation cause a breakdown of soil structure. Meadows are good in building structure. Cover crops, though not as valuable as meadows, will help the soil tilth, but the improvement does not last as long as the tilth produced by meadows.

There is no sure way to measure soil tilth. The method we used, however, is to measure the amount of soil crumbs, called aggregates, which will not fall apart in water. We want the soil to be crumbly. In western Iowa, soil under a rye and vetch cover crop was 5 per cent better aggregated than a soil without the cover crop. This was in April. Later on in the summer there was no difference.

Although the influence of the cover crop on the soil structure was gone by midsummer, the soil did have a better tilth during the

time of spring rains. This is a critical time from the standpoint of soil and water losses.

Water moves through large pores or openings faster than through the small ones. The faster the rain can go into the soil the less water will run off. The less runoff the smaller the amount of soil lost. Anything you can do which will increase aggregation will increase the number of large pores in the soil. This is how cover crops affect soil and water losses after the crops are plowed down.

In some trials we found that where cover crops were grown in corn and plowed down in the spring, with no crop on the land, less soil was lost. Without a cover crop the soil loss from January 1 to July 1 was 3.56 tons. With a cover crop the soil loss was only 0.15 ton.

Cover crops have not greatly increased corn yields in our tests. Most of our cover crops have been on fertile soils. Larger increases might be expected on poor soils. To date in western Iowa cover crops have increased the yields about 2.7 bushels of corn per acre. At Ames there was also a 2.7 bushel per acre increase in the yield of corn in favor of cover crops. This was an average for 1945 and 1946.

Grapefruit - Beef

Now they're feeding fresh grapefruit to cattle.

At least the Florida Experiment Station tried it recently and found it an acceptable diet for fattening steers. The steers fed grapefruit gained an average of 1.85 pounds per day during the 120-day test period, Another lot fed grapefruit and 2 pounds of ground snapped corn a day averaged 2.13 pounds gain. This compared with a 2.40-pound gain for the cattle getting straight ground snapped corn.

The Florida folks rated the quality of beef produced in all lots as good. A *Farm Journal* correspondent sampled some of the grapefruit-produced beef, and agreed with the official verdict.

Farm Journal

How Our Land is Used

Condensed from the Agricultural Situation

L. A. Reuss

Bureau of Agricultural Economics

THE land area of the United States is about 1,905 million acres, not counting important rivers and lakes. Three-fourths of the land is used for crop and livestock production. The cropland, pasture, and grazing land add up to nearly 1,500 million acres. Besides, there are about 260 million acres in forests, used mostly for producing lumber, pulpwood, and fuel wood. Thus crops, pasture and timber take about 1,700 million acres, or 90 per cent of the Nation's land area.

Of the other 10 per cent, about 94 million acres, of slight agricultural use, consists of deserts, rocky areas, swamps and the like. This portion of the land has some of the Nation's mineral and oil deposits. In addition about 87 million acres are used primarily for recreation and travel, made up of parks, game refuges, railroads, highways, farmsteads, military lands, and similar tracts. And, finally, there are about 13 million acres in cities and towns. These are the major uses of the land, though much of it is used for several purposes.

Only about a fifth of the land area, or a little over 400 million acres, is used for crop production. This includes the land actually used in raising crops as well as idle or fallow cropland. In recent years about 350 million acres have been planted in crops or used for growing them. Thus, the enormous crop production of present day agriculture comes from less than a fifth of the land area.

A third of the cropland is located in the Great Plains, a fifth in the Corn Belt, and roughly a sixth in each of the following regions: the Northeast and Lake States, the South and the West.

By far the largest single use of the land, involving over a billion acres, is for pasture and grazing. Production of livestock and livestock products thus takes up well over half of the land area. This doesn't include cropland used for growing feed. About 700 million acres of grass land and 350 million acres of forest land are used for pasture and grazing.

As would be expected, nearly three-fourths of the pasture and grazing land is in the West and

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Great Plains, with much of the balance located in the South. Smaller amounts are in the Northeast, Lake States, and Corn Belt.

More land is in farms now than ever before. The 1945 Census reports about 1,100 million acres in farms. This is nearly 80 million acres more than in 1940, and 250 million more than in 1900. Some of this increase is due to changes in census definitions. Before 1940 much of the grazing land in the West was not counted as land in farms. Today the land in farms is 60 per cent of all the land in the country. The remaining 400 million acres used in crop and livestock production consists mostly of public land used for pasture and grazing. Just about all of the cropland is in farms.

Of the 257 million acres of forest land not grazed—that is, used primarily for producing lumber and pulpwood—89 million acres, or little more than a third of the total, are located in the West. Another 89 million acres are in the Northeast and Lake States. The South has about 61 million acres of forest land, a little more than a fifth, while the Corn Belt has only about 18 million acres.

The bulk of the land used for urban purposes is located in the industrial Northeast and States bordering the Great Lakes. In Connecticut, Massachusetts, Rhode Island, and New Jersey, more than 10 per cent of the land is in urban use such as factories, homes, and office buildings. Elsewhere urban areas account for only 1 or 2 per cent of the land in each State.

Although there are parks, game refuges, and military reservations in just about all the States, most of the land used for these purposes is found in the West, particularly the Rocky Mountain States. The West also has over 80 per cent of the desert land, rocky areas, swamp land, and other land of little agricultural value.

About 75 per cent of the Nation's land is now privately owned. About 20 per cent is owned by the Federal Government. A large part of the Federal land is forest, grazing land, and desert, and is located in the West. Much of it is used by farmers and ranchers, while some is in national parks, game refuges, Indian reservations, and military establishments. The other 5 per cent of the land is owned by State and local governments, with a good deal of it used as parks, forests, and grazing land.

One Man Egg Factory

Condensed from Poultry Tribune

G. T. Klein

Massachusetts State College

ONE man can take care of 4,000 to 5,000 laying birds if he has the right set-up for the job. I say that advisedly, because it is being done, but with the reservations that the house must be planned right and must be fully mechanized.

Jobs for workers are coming up for serious thought. With the talk of lower prices in the days ahead, it is wise for efficiency to receive some serious consideration, because it is about the only way that costs can be lowered.

Jim Selden had those things in mind when he built his plant in Essex County, Mass. How many birds can a man care for? How can a house be planned to make it easier for him to do his work? What is the best plan for feeding, watering, caring for litter and manure, gathering and grading eggs? Selden came up with a fair answer to these questions.

Figuring that a man can feed, water, gather eggs, do some of the litter cleaning, and some of the egg grading for a flock of about 4,500 birds (brooding and rearing not included), here's about the way he worked it out.

Pens are 40 by 40 feet square, with floor space cut to about 3 square feet to the bird for Production Reds. Including males, pens carry about 550 birds, and they don't seem crowded. Litter goes through the winter in reasonably dry condition. If no bacterial disease which would carry over appears in the flock, the litter will not be changed from one year to another. This will give litter that will stay dry under any conditions.

Ventilation in the house is the same as is used so successfully throughout New England. Sliding windows in the front give any number of adjustments, and there are slots above the windows for additional control of air movement.

The house is a double decker, with the feed room located on the second floor, at one end. Carriers service each floor with feed, which is dumped into the carriers on the second floor, direct from bags. Carriers on the first floor are filled by dumping the feed into chutes, which run

Reprinted from the Poultry Tribune, Mt. Morris, Illinois, June, 1947

from the second floor to the first. The egg room is located on the first floor, under the feed room.

Large pens are not an experiment in Massachusetts. They are used on several of our most successful commercial egg and breeding farms. They cut construction costs per square foot of floor area and cut labor costs in caring for birds to such an extent that they are worth considering. Selden is not the only one who has come up with the figure of about 4,500 birds as an easy job for one man, if working conditions are right.

Keeping the litter dry is the first consideration of Selden and every other poultryman. He has observed that the longer litter is used, and the deeper it is, the drier it stays. He has no plans for changing it at the end of the year unless some bacterial disease appears which will make a change necessary.

When first starting with it, new material is added, little by little, building it up to four or five inches in depth. As an aid to further dryness, hydrated lime is added at the rate of about 1 pound to 3½ square feet of floor area. This is added in October, and has a noticeable drying effect. The lime is added to the top of the litter, and the birds, in scratching, work it through the litter. An even earlier addition of lime might be better.

If continuous use of litter in the laying pens seems too hazardous to Selden, he will adopt the plan of getting the litter in the houses by mid-summer, so that it will be in fine condition and "built-up" by winter. Under most conditions, it is considered safe to take litter from brooder houses for use in laying pens.

From the supply of mash, pellets, grain, and shell on the second floor, in the specially-built and heavily-braced feed room, feed carriers are loaded with feed for distribution to hoppers in the pens. A large scoop, holding nearly a quarter bag of feed, makes distribution from carriers to hopper easy. One scoop of mash usually replenishes the supply in the hopper. Three trips a day through the house with the carrier is the maximum. This will take care of grain, pellet, and mash feeding.

Feed for the lower floor is dumped into a large funnel projecting above the feed room floor. A metal chute carries the feed to the carrier below, which has a capacity for 400 pounds of feed. The metal chute can be moved from one part of the carrier to another for uniform filling.

On feeding trips through the house, birds are observed and waterers are checked, but egg gathering is reserved for special trips.

Selden's house has the Massachusetts clean egg nests located along the north wall. Eggs are gathered three times daily, unless unusual conditions prevail. Litter in the nests is replaced as needed, but with this type it requires little attention and few dirty eggs are found. Broody birds, if any appear, are confined to coops each evening.

The basement location for the egg room has several advantages. It saves carrying eggs to other buildings, and gives an opportunity for the poultry worker who tends the flock to spend spare moments in egg grading.

Selden along with others, has found that egg cleaning is not much of a job if floor litter is dry and litter can be kept in nests.

Dropping pits, located near the center of the room, are cleaned three or four times a year. Both manure from the pits and floor litter are shoveled out through storm doors in front. Roosts are painted with carbolineum once yearly, to control mites.

Continuous-flow waterers are used in this house. There is no freezing of pipes, but there is some throwing of water from the beaks and wattles, with the result that litter around the fountains becomes wet to a degree. This cannot be avoided, it seems, with such a concentration of birds in a small watering area. The shallower the drinking pan, the less water is thrown, observation shows.

In planning for good labor efficiency there is need for having a full-time job for a worker in one building. A worker can keep busy if given the job of caring for 2,500 layers and he finds little time for other jobs on the farm. There is greater labor economy if units are large enough to keep one worker busy with layers, another with brooding. This also is good disease control planning.

New Feed from Forests

United States forests are about to become a source of cattle feed and chicken feed. This could even be used by humans, although it will probably go to livestock. The feed will be yeast, manufactured from waste liquor from paper mills.

First plant of its kind in the United States soon will be established at Rhinelander, Wis., to manufacture 100 tons of yeast a month.

The yeast-making process was extensively used in Germany during the war.

Farm Journal

The Osage Cattle Kingdom

Condensed from The Cattleman

C. Faye Bennett

"I SAW a prairie, a huge sea of grass spotted with islands of woods where a series of round hills rise like waves, a hill, a plain cut by a river with wooded banks, then hills, and more plains as far as the horizon," said the venturesome Frenchman, Tixier, when, in 1839-40, he wandered into the vast country of the Osage Indians somewhere along the present border between Kansas and Oklahoma. And, he continued, "the bison which is found beyond the Osage village in large herds decrease in numbers every year. The savages wage a merciless war on them: it can be said they waste a great many. These useful animals, the hunting of which is a need and a pleasure for the redskins, will disappear someday and that day the redskins will begin to be civilized for there will be no existence possible for them unless they engage in agriculture and industry."

The far famed blue stem grass of Osage county, Oklahoma, was good for the buffalo, the wild horse and the deer, and its story continues to mark the pages of history. The discovery of the peculiar grazing qualities of the blue stem grass of Osage county, combined with the discovery of oil on the Osage Indian Reservation, made Osage county wealthy from the two greatest sources of wealth in the world, namely: grass and oil.

Today the same limestone prairies, lush with grass and tempered with a genial climate, are often called the world's best pasture. As a center of grazing for fine Quarter Horses, sheep, hogs and approximately 225,000 head of beef cattle annually, Osage county attracts nation-wide interest in cattle, banking and education, because of its widespread economic, educational and cultural significance.

In the beginning the Osage grazing lands were life and a living for man and beast. All through the tumultuous furor of war and rumors of war, redskin against redskin, white men and Indians, pot boiling politics, the inevitable passing of the frontier and the ultimate shrinking of fabulous fortunes in oil, it was the good grass from the Arkansas

Reprinted by permission from The Cattleman, Fort Worth, Texas

River on the south and west, north to the border of Kansas that the cattle barons sought.

Long before there was sufficient patronage to lure railroads into the area, practically all herds on the overland trail from Texas to Kansas passed through central and western Oklahoma. The superior beef fattening quality of the big and little blue stem grass was noted by cattlemen. In some instances the land was quietly occupied without the formality of securing leases and agitation for the opening of lands adjacent to the Indian land was loud and continuous. Many cattlemen leased grazing lands from the Indians.

Ranchmen, herdsmen and oil men from far and near replaced the traders and trappers who made their way to the Agency at Paw Huh Scah (Pawhuska), to bargain with the Indian agent who served as guardian for the rights and mutual benefit of the 2,229 original full-blood Osages under government protection. The full bloods were given "Head Rights" and shared equally in the distribution of proceeds realized from the sale of oil and gas on the reservation. The wealth producing sales, which made the Osage Indians the richest per capita race of people in the world, probably had the far-reaching effect of a boon to the cattleman.

It is reported that Colonel E. Walters, who served as auctioneer for all leases in the Indian Reservation, sold more than three hundred million dollars' worth of leases to various oil companies. Many of the sales took place beneath the so-called "Million Dollar Elm Tree," which stands near the Indian Agency at Pawhuska. One 160-acre lease was sold to the Midland Oil Company, a subsidiary to the Empire Companies, for $1,990,000, the highest price ever paid for the privilege of drilling on a 160-acre tract. "The derricks stood black against the red of sunset and where they were thickest, little towns grew among the hills and valleys . . . after the great frenzy, when the little towns were deserted, they became the first desolation on the rolling prairies."

Royalties from head rights continued to support the Osage Indians in comfort and style. Many intermarried with the white race and attained positions of social and political importance.

But the cattlemen wanted the land. The land where the prairies curve into spring-filled canyons, the plains broaden and spread into encircling blue hills and the keynote of the whole is grass. Such grass that men have argued whether it grows as high as a horses's back, or as high as the head of a man riding on a horse. Grass that has never been

touched by a plow. Grass with the same outward appearance of grass in other localities but varying widely from other grass in the length of time it takes to fatten a steer. Nature's own grass supplied with nature's own minerals that will fatten cattle as quickly and as well as corn in ninety days. Grass that will add two and one-half to three pounds of weight per day to a steer. And "not even two per cent of the soil in the United States will do that!"

The land is abundantly blessed with zigzagging streams of living water. Water in every part of the county.

The cattlemen awaited the inevitable hour that ultimately brings, "the best land into the hands of the best farmers."

With the coming of statehood, and the right to buy surface rights to the land, the Indians more willing to sell, since their livelihood no longer depended upon it, land-hungry men began to acquire and accumulate large and small tracts, and some royalty head rights.

The major portion of the "big pasture" today belongs to pioneers and the sons of pioneer cattlemen, who, at the first opportunity, purchased land. Thus in approximately forty years time, three families in the county have acquired one hundred thousand acres each. Others own from thirty thousand to fifty thousand each, and still another group from six to ten thousand acres each. The vast acreage, the large herds moving to and from the grazing area, investments and profits can only be measured by figures running into the hundreds of thousands. Long, stout, well-built fences, some of which inclose approximately thirty thousand acres in a single pasture, six thousand ponds, many of them ranging down the canyons, one after the other, at a depth of from one to thirty feet, mark the pride, profit and improvement side of the ledger.

Under ordinary conditions, the grazing lands will feed and fatten one steer for each seven acres and a two or three year old steer shipped into the area weighing from seven hundred to eight hundred pounds in early April will gain from two hundred fifty to three hundred fifty pounds by the end of August with no additional feeding.

The low cost of fattening a steer for market at $12 per season, or 4 cents per pound as compared to 20 cents in the feed lots is reason number one for the dominant place of Osage country in the beef cattle industry, in spite of the fact that the grass-fed steer will not quite top the dollar with the corn fed steer on the market.

The Osage cattle industry may be divided into three general classifications, though one may overlap the other:

(1) A rancher owns his land and raises his own cattle.

(2) A rancher owns his land, raises part of his herds and buys cattle elsewhere to graze and market.

(3) A rancher owns his lands and leases it to the cattlemen. He agrees, by contract, to provide water, salt, and grass—four to seven acres per head—guarantees against theft or loss and delivers the cattle back to the railroad at market time for $10.00 to $12.00 per animal.

According to the 1946 estimate of County Agent H. K. Shearhart, there were 225,000 cattle in Osage county, of which 115,000 were native cattle and 110,000 were brought in for grazing. Of the total number there were approximately 70,000 cows, 60,000 young cattle and 95,000 steers.

High grade Herefords from the best cows and heifers in the herds mated to registered purebred bulls, dominate the Osage. For beef purposes, the Osage cattlemen agree, high grade cows are the hardiest rustlers.

Three-year-old steers are preferable for grazing. Due to the fact they have attained their full stature and fatten easily, the long, lean, lanky grazers of any size, color or breed, will regain their seven per cent shipping shrinkage in a few days time, and from there on will fleshen rapidly. By September 1st, they are all on their way to market where they will dress out at the rate of 55 to 58 per cent. Some are shipped to the corn belt for a fine finishing touch.

There is a noticeable tendency in the Osage cattle domain to make the big business of beef a family affair and keep it there. Now, well along in the second and third generation of the industry, the land, in many cases is owned by the sons of pioneer cattlemen. Land is hard to buy at $25 per acre, since it is mostly owned by people who want to keep it.

Five families of Drummonds, all sons and grandsons of Frederick Drummond, who came to America from Scotland in 1885, own one hundred thousand acres of land in the Hominy and Pawhuska area.

On the one hundred thousand acre Chapman-Barnard ranch, north of Pawhuska, cattle from jointly owned land in Texas and New Mexico are shipped in to be finished for market. Three trained greyhounds are used by the foreman, Ben Johnson, for killing coyotes and wolves.

The fertile valleys of many spring-filled creeks, abundant

meadows, lush prairies and the shade and shelter of the timbered hills on the E. C. Mullendore ranch at Hulah, Oklahoma, have proved good for diversified livestock farming. In addition to a splendid high grade herd of twenty-five hundred Hereford cows which produce 85 per cent calf crop annually, the lush grasslands support approximately six hundred head of registered Duroc Jersey hogs, three hundred registered sheep, a herd of wild deer, some buffalo, a few Longhorn steers, the splendid registered King Quarter Horse stallion of Joe Bailey breeding, and many registered Quarter Horse mares and colts.

Self - Feeding Lambs

Fattening lambs may be self-fed from start to finish, the Minnesota Experiment Station finds.

The trick is to mix the grain with the roughage to prevent over-eating. The Minnesota folks started the lambs on a mixture of 40% corn and 60% ground alfalfa. The corn was then increased 10% each week up to a mixture of 90% corn and 10% alfalfa.

Lambs fed from 60% to 80% corn made the most money. There was little difference in gain, so the choice will depend upon prices of corn and chopped hay.

It paid to grind the corn coarsely, in the Minnesota tests. The lambs ate more grain, but the larger gains more than paid for it.

The alfalfa was run through a roughage mill, using a ⅜-inch screen. Some farmers are using field-chopped hay, cut in ½-inch lengths. The idea of the short cut is to get a better mixture. With longer-cut hay the corn will tend to work through to the bottom of the feeder.

Farm Journal

Hot Hay!

Condensed from The Ohio Farmer

J. D. Blickle

Agricultural Engineering Department, Ohio State University

HIGH quality hay can be made by cutting forage crops at the right stage of maturity, and curing them in such a manner as to save the leaves and conserve the green color.

The greatest hazard in the production of quality hay is the weather and the chances of running into unfavorable weather when making hay are pretty good. A study of the Ohio weather reports for the past 50 years shows June and July as months with the greatest average rainfall and August trails not far behind as one of the wetter months. In June we can usually expect one-half of the days to be clear. The balance of the days will be cloudy or partly cloudy and about 10 of these will have a rainfall of 0.01 inch or more. When we are fortunate enough to have several of the clear days grouped together, all is well for haymaking by the field-curing method, but when we have the clear days alternating with the cloudy and wet ones, we are in for trouble, and must look to some other means for making quality feed from our forage crops. This is a situation encountered far too often at haymaking time.

When we make hay we pay for a quality product whether we obtain it or not. It costs just so much in land fertility, seed, fertilizer, investment in equipment and labor to go through the motions of producing poor quality hay. In addition we pay for the cost of feed necessary to supplement the poor quality hay.

Generally speaking there are two practical ways of harvesting and storing forage crops for hay: (1) complete field curing and (2) partial field curing followed by the finishing of the curing process in storage by the use of forced air.

The method of curing hay in the field is wholly dependent upon favorable weather conditions. The hay is usually cut and windrowed the same day and hauled to the barn after the moisture content of the hay has dropped to approximately 25 per cent. The time elapsing between cutting and placing in the mow may vary from an average of 24

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hours in excellent haying weather to well over a 100 hours in unfavorable weather. Some of the disadvantages of this method are: (1) danger of damage or total loss due to cloudy weather, high humidity and rain, (2) loss of leaves by shattering, and (3) loss of green color by bleaching.

To overcome the weather hazard in haymaking the method of mow-drying or finishing has been developed. The hay is cut, the same as for field curing, at the proper stage of maturity. It is allowed to cure partially in the field until a moisture content of 40 to 35 per cent is reached or the hay is still green enough to prevent the leaves from shattering when handled. In good drying weather the hay may be cut in the morning and placed on the mow drier late in the afternoon of the same day, or it may be cut in late afternoon and stored the following afternoon. If drying conditions are less favorable the hay should be left in the field for a longer period. In adverse drying weather the hay may be placed on the drier at higher moisture content and dried successfully. This practice increases the cost of drying; consequently it should be followed only when it is necessary to save the hay.

The mow drier on which the partially field-cured hay is placed finishes the curing process by blowing air through the hay until it is dry. The drier itself is constructed on the mow floor and is made up of a fan capable of moving a large volume of air at relatively low pressure, a motor or power unit to drive the fan, a large main air tunnel placed along the side or in the center of the mow—whichever is the most convenient location, and a series of small ducts or a slatted floor placed on the regular mow floor and attached to the main air tunnel.

The fan is located to blow air into the main tunnel which conducts the air to the slatted floor or ducts. The partially cured hay is placed on the slatted floor or ducts and the air is forced up through the hay from the bottom until it is dry.

The mow drier goes a long way in taking the weather gamble out of hay-making and it provides excellent protection against spontaneous combustion in the mow.

Forced ventilation is also used in hay silos or "hay keepers" for finishing partially cured hay.

Mow driers work satisfactorily on long, chopped or baled hay. However, it must be remembered that chopped and baled hay are more dense than long hay and a drier that will handle a 12-foot depth of long hay will handle only 5 or 6 feet of chopped or baled hay at one time.

Mow driers are becoming very popular. It is estimated that approximately 500 mow driers will be in use on Ohio farms this year. The cost of installation is estimated to be from 40 to 50 cents per square foot of mow floor area covered by the drier. Reported operating costs range from 90 cents to $1.75 per ton of dry hay. A 5-horsepower motor will handle a drier covering 1000 to 1600 cubic feet of mow floor area and a 7½ horsepower motor will operate a drier system covering from 1600 to 2000 square feet of floor area.

Another means of preventing the hay crop from becoming a total loss because of unfavorable weather conditions is to convert it into silage. Forage crops cut for hay and later converted into silage usually have a fairly high dry-matter content. For this reason they should be chopped as fine as possible. The silo walls and doors must be sealed tight to prevent air leaks. The cut material should be packed as uniformly and tightly as possible. A top seal of 2 or 3 feet of heavy green hay should be placed on the silage as soon as filling is completed to seal out all possible air. A covering of weather-proof paper weighted down will add materially to the top seal.

There is always danger of spontaneous combustion in hay that is stored before it is properly cured unless a hay drier is used. Hay wet by rain is generally considered more susceptible to spontaneous combustion than normally cured hay. It is a good practice with chopped and baled hay to field cure it more carefully than long hay to prevent excessive heating. Improperly cured hay is more apt to heat in large mows than in small ones because of the larger mass of dense material. Hay heating may also be caused by leaky roofs, rain blowing in open windows or doors, and the placing of hay on damp floors.

Temperatures of 125° F. to 150° F. in the hay are unusual. Temperatures 150° F. to 160° F. are in the danger zone and provisions should be made to remove the hay. Temperatures of 160° F. to 170°. in the hay are dangerous, and hot spots are apt to appear if the temperature goes to 175° F. All doors and windows should be kept closed. The fire department should be called and the insurance agent should be notified.

For temperatures of 180° F. all live stock and tools should be removed; the hay should be removed under adequate fire department protection, and if it is necessary for anyone to enter the mow he should walk on planks to avoid dropping into burning pockets, and he should have help handy.

The Fertilizer Rate Problem

Condensed from Better Crops with Plant Food

R. E. Stephenson

Soils Department, Agricultural Experiment Station, Corvallis, Oregon

A FARMER reported 100 pounds of sulfate of ammonia used on onions; another reported 100 pounds of sodium nitrate used on mint. In neither case was there any appreciable response, and crop growth was entirely unsatisfactory—so much so that assistance was sought to diagnose the trouble and explain the unsatisfactory growth and harvest.

In both cases, regardless of what else may have been wrong, the fertilizer program was inadequate. In both cases a complete fertilizer should have been used, and a sulfur carrier should have been included for the particular area. Considering nitrogen alone, the 20 pounds supplied the onions could not contribute a very great increase in growth. A 300-bushel yield would have 40 pounds of nitrogen in the bulbs and at least that much in the tops. Crops seldom recover more than 75 per cent of the nitrogen supplied in the fertilizer, and a 50 per cent recovery is reasonable. A 10- to 15-pound nitrogen recovery where 80 or more is needed could not be expected to cause much increase in yield. The mint crop was still more inadequately fertilized.

These are isolated cases but are typical of much fertilizer practice. The reason probably is lack of knowledge of plant requirements and perhaps partly lack of well-established faith in commercial fertilizers. In some cases, no doubt, disappointing experiences may have been to blame—at least there was not a full understanding of the needs of a growing crop or the means of meeting those needs.

In fertilizer studies with cover crops it was found that 100 pounds of nitrogen in the fertilizer (not 100 pounds of fertilizer) when broadcast on the surface in early spring (February) gave excellent results. Use of 50 pounds of nitrogen usually gave appreciable increases, but 25 pounds of nitrogen could seldom be detected either in the appearance of the cover crop or in the weighed amount of growth. A farmer using the light rate probably would have considered the

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fertilizer of no value, as was true because of its inadequacy. The farmer who used 100 pounds of nitrogen would have been well pleased with the results.

Crop increases cannot come from nothing. As one observer stated—to produce a big increase from so little fertilizer is an impossibility that would be quickly recognized with a little study of what takes place in plant growth where fertilizers are used. In the first place, the crop, the bacteria and fungi of the soil, and the soil itself compete for nutrients that are present or added as fertilizer. In the case of phosphates, soil fixation may commonly prevent two-thirds or three-fourths of the applied phosphorus from contributing to plant growth. In the use of fertilizer, this fact must be taken into consideration. A 10-ton tomato crop needs about 35 pounds of phosphoric acid for growth. But if the soil gets 105 pounds and the grower expects to add 10 tons to his yield with fertilizer, there would need to be at least 140 pounds of phosphoric acid applied per acre. This is equivalent to 700 pounds of 20 per cent superphosphate.

Nitrogen is the most evanescent element applied to the soil. It leaches readily and is likely to be lost in the drainage. Gaseous forms of nitrogen develop not only in the manure heap but in the soil, and losses may occur in this manner. A carbonaceous residue such as straw in the soil results in a large utilization of nitrogen by bacteria and fungi that rot the straw. There is a good measure of uncertainty, therefore, as to what may happen when nitrogen fertilizer is used. A 10-ton tomato crop uses about 100 pounds of nitrogen, the amount supplied by 500 pounds of sulfate of ammonia. But if crop recovery is excellent and such a yield impossible, it may be necessary to supply more than 700 pounds of sulfate of ammonia to the soil to meet the crop needs for adding 10 tons to the yield. Results will probably be better if the application is broken up and a side dressing or two is made at appropriate times. There would then be less chance for loss, and more of the nitrogen would go to the tomatoes at critical times in the growth period of the crop.

In the case of potash, the story is somewhat the same. Leaching losses are not unusually high, but there is considerable fixation by the soil. At least a part of that fixed by the soil may ultimately become available to crops, but the immediate crop cannot get it. There is the necessity, therefore, to provide more than the amount that is equivalent to the demands of the crop increase that is expected. The same principle applies to all elements which crops

need and which must be supplied in the fertilizer that is used.

An important part of the problem in the use of fertilizers is to use them in such a way that the crop can receive the greatest benefit. A study of methods and time of application has been very helpful in increasing the returns from fertilizers. Such things as keeping the fertilizer off the plants or seed are now pretty well understood. Recent studies have brought out certain advantages of deep application, often designated as "plow-sole" application. By this method, the fertilizer is concentrated in rills in the bottom of plow furrow. The fertilizer is then deep enough to be in moist soil during most of the growing season. In dry years, fertilizer is much more effective when applied deeply. The deep fertilizer may not become effective quite so early in the growth period, but it remains effective, if enough is used, until a good harvest is produced. There is also the minimum of soil fixation where the fertilizer is applied beyond the depth of cultivation. Mixing the soil and fertilizer by cultivation is a contributing cause of high fixation.

The most approved methods of fertilizer application make it possible to use heavy rates safely, whereas the same rates carelessly used might cause more damage than good. One grower is reported to have unwittingly mixed the soil and a large amount of fertilizer. He then set his tomatoes in the fertilized soil. Fortunately the mistake was discovered, the tomatoes in the much-fertilized soil had to be reset. The same fertilizer a few inches away from the plant or on the plow sole probably would have worked well. I have seen excellent beans grown in basement subsoil where liberal fertilizers were applied on the plow sole. Liberal fertilizing also demands an adequate moisture supply if the fertilizer is to be most effective. However, drouth damages are minimized by adequate fertilizing.

Much of the drouth damage is due indirectly to lack of available nitrogen. Most of the organic matter is in the topsoil. Nitrates are produced by breaking down organic matter. Therefore, soils in dry weather are devoid of nitrates because nitrification cannot take place in dry soil. Moisture is necessary for the bacteria which form nitrates. That is why nitrogen fertilizers placed deep enough to be in moist soil is effective in partially overcoming drouth. Or the lawn fertilized in early spring before the drouth comes goes through dry weather better because some reserve of nitrogen has been stored in the root system of the grass and possibly in the deep soil to carry

the grass through the dry period.

There are two critically important times in the growth period of the plant. These are when growth starts and again at fruiting time. Booster solutions used on plants that are reset have been helpful in overcoming the shock of resetting. A light application of fertilizer in the row near the plants for seeded crops has proved helpful in giving the crop a good start. Side-dressings used later in the growth period, particularly just before fruiting, contribute to an improved harvest. At no time in the growth period, however, should plants be allowed to suffer because of lack of available nutrients, or both the quality and quantity of the crop produced may be disappointing.

It is important to provide by complete fertilization that there be no nutrient deficiency, especially when high value crops are produced. Nitrogen alone may produce an increase, but the increase may be limited because there is not enough available phosphorus, potassium, sulfur or some other element to support the maximum possible increase. An additional $5 an acre to include potash in the fertilizer program when a $500-per-acre crop is produced is the cheapest insurance against the reduced yields which might result from potash deficiency.

The economic factor can never be overlooked in deciding upon fertilizer rates. A crop of corn would seldom be worth more than $100 an acre, even with high yields and high prices. A crop of filberts or walnuts, however, may bring more than $500, and a crop of cherries may bring more than $800. Other crops may bring even higher returns. On these crops any amount or kind of fertilizer necessary to get results can be used. Some orchardists in citrus areas have spent $100 an acre for fertilizer. The same expenditure on corn or wheat might be twice the total value of the crop. A fertilizer trial on filberts showed enough increase so that the returns from one year would pay the cost of adequate fertilizatioin for several years to come. An increase sufficient to return a profit for one year is acceptable to the farmer.

How much fertilizer to use then must be decided after considering many factors. Present yields are usually known within certain limitations. A 50-per-cent increase from adequate fertilization is a reasonable expectation. Doubling the yield is not impossible. We have more than quadrupled cover crop yields with fertilizers used in orchards. We have under favorable conditions increased the yields of nuts and fruits by 50 per cent.

The element of time must be given due consideration in plan-

ning the fertilizer program. Some crops are harvested six weeks after planting, and some may require more than six months. Orchards may not begin to bear for six years and may still be in production at 60 years. On early vegetables, fertilizer response is immediate if at all. On an orchard that is run down, a minimum of three to five years may be required to build enough vitality into the tree to show a response at harvest time. It is a very different problem then to fertilize a plant that grows from a tiny seedling to harvest in six weeks and fertilizing a stunted and starved tree which already has made a relatively enormous but inadequately nourished growth. These factors are particularly important influences that govern expected fertilizer responses.

In deciding on fertilizer rates, two major factors must be kept in mind. How many bushels, pounds, or tons are a reasonable expectation to add to the present average yield of crops? Then after making due allowance for soil fixation and various other factors that affect crop yields so far as they can be anticipated, enough of the various known deficient elements with some margin of safety to produce the hypothetical crop increase that appears reasonable should be provided. Seldom perhaps will full expectations be realized, but the method is less haphazard than the entirely too common practice of applying whatever amount or kind of fertilizer may be conveniently obtained. After consideration of the possible fertilizer needs to produce a good crop increase, due consideration must be given to the value of the increase. If 10 bushels can be added to a 20-bushel wheat yield, a relatively small fertilizer application is all that is economically justified. If, on the other hand, 5 tons can be added to a 10-ton yield of green beans while the price is more than $100 per ton, the cost of the fertilizer can be forgotten. All that is needed then is the courage to go out and apply what common sense and one's best judgment signify should be used. With adequate attention to proven information relative to fertilizer rates and usage, much increased production and considerable increase in profits could be added to the present level of production and income.

The Miracle of Our Food Production

Condensed from American Agriculturist

A. B. Genung

MANKIND'S biggest and most urgent job is the production of food. Even this wealthy industrial country spends a fourth of all its economic effort getting food out of the ground and distributed, while in Asia a billion people still put their energies almost solely to that job.

The Orient, with over 80 per cent of its people in agriculture and men, women, and children working as hard as they know how, still can't stave off periodic famine. And that picture is as old as time.

But on this side of the earth a remarkable thing has happened. Here for the first time in all history, on a continental scale, we have really pushed back that keenest of human worries—hunger. Few of us born in this land know how new and unique, historically, is that feat. Nor do some observers understand how skillfully our farmers have done it on a man-made, sustaining basis, and not merely as the legatees of a virgin soil.

Consider four million farms (the surplus producing part of our 6 million) with fewer than 11 million workers, turning out food and fiber for 140 million Americans and 30 to 40 million foreigners besides. In respect to its results, our farming today exemplifies a miracle.

It is hardly surprising that we fail to view this marvel in true perspective. The whole thing is so recent that great-grandfather's grain cradle and flail still hang in the barn. Actually that close to us — and almost unchanged— stand the implements and technique of the Pharaohs; for from great-grandfather back to the captive Hittite wielding his bronze sickle beside the Nile, stretches virtually a thirty-century still-picture of agricultural toil. From Joseph to George Washington there was singularly little change in the tools or the manner of wringing food out of the soil. You can still see that age-old man with the hoe at his daily drudgery anywhere east of Suez.

Then came this revolution here in the western world—in America. Let your eye and your mind dwell upon those big engines of production that stand there now in the barn, next to

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yesterday's cradle and flail. The harvester-thresher combine for instance, a tool at which those numberless generations back of grandfather would stare uncomprehendingly. How, indeed, could we interpret to our oxen-driving, hand-working ancestors of only a lifetime or two ago such things as tractors and gang plows; corn and cotton pickers; flame cultivators; hay loaders and driers and pick-up balers; automobiles and motor trucks; airplane dusters and automatic drainage pumps; electricity with its lights and motors, milking machines, refrigeration, bench equipment?

In what terms could we tell them of thousand-pound-butter cows, ten-litter pigs, trapnested hens, hybrid corn; of vaccines and chemical sprays; of quick freeze lockers and farm canneries and concrete roads?

There are critics who say that our farmers are inefficient wasters, compared with the peasants of Europe and the Orient. That our agriculture is an exploitive enterprise, operating precariously upon the cream of fertility skimmed from a virgin continent.

It is true that our forefathers took over a vast, virgin domain; that they settled it, cleared it, and got it under the plow in a hurry; that in that epic hurly-burly they cleared considerable hill land and inferior land east and west which now is properly going back into trees or grass. We are still in the developing phase of a swiftly built continental agriculture. The important thing is not that mistakes were made but that, by a rational selective process, our commercial production already has worked around largely to the good lands. You cannot become cynical over a waning Appalachian tillage and at the same time ignore what is happening in the lush valleys. The process is all one. Economic forces are adjusting the use of the land rapidly and well to the national advantage.

One test of a conservative, as opposed to an exploitive system is whether it maintains yields. Our important crop yields are going up, not down. Take the averages for several ten-year periods, say, 1866-75, 1901-10, and the last years, 1937-46, and compare yields per acre for the whole United States. The averages for the three periods respectively are: corn 25.6, 26.4, 31.5 bushels per acre; wheat 12.3, 14.4, 16.5 bushels; oats 26.5, 29.5, 30.6 bushels; potatoes 86.9, 93.1, 136.3 bushels; cotton 162.6, 182.5, 253.4 pounds per acre. Total crop yields per acre rose about 23 percent in the 25 years 1919 to 1944, or nearly one percent a year.

Our livestock industry, which is the hallmark of conservative

farming, is relatively large. Livestock production per unit also is going up, not down. The production of hogs per unit of breeding stock, in the last 25 years, has risen about 44 percent; of all cattle about 27 percent. Milk production per cow rose from about 2,800 pounds in 1910 to over 4,700 pounds in 1945; egg production per hen from 104 to 150 eggs yearly.

The critics say that these amazing gains have been made only at a disproportionately higher cost. But in the area of greatest gains, the cost of production per unit has gone down, and I do not mean merely dollar cost. In the Corn Belt the quantity of feed used to produce 100 pounds of pork was reduced to 10 to 15 percent just between the 1920s and 1930s. Between 1920-24 and 1937-41 the feed concentrates required to produce 100 eggs was cut about 12 percent on the average.

Such gains are absolute; nor were they got by exploiting the soil. They resulted from better breeding; cutting disease losses, especially of calves, pigs, chickens; better balanced rations; use of more legume hays, oilseed meals, and other high protein feeds; better housing, and skillful management.

The increase in crop yields has been achieved largely by similar improvements in technique. One phenomenal case of improved seed alone, hybrid corn, has stepped up its yield nearly 20 percent. The use of chemical fertilizers, in terms of total plant nutrients, rose from 388,000 tons in 1900 to 1,680,000 tons in 1940. More lime, too. And for the most part, the farmers who combined the largest use of fertilizers with their other efficiencies were the ones who reduced cost per unit of output the most. They are not making their gains out of virgin soil.

The United States does have a soil conservation problem. What mature country doesn't? The men who manage our real surplus producing farms, who turn out our national food supply, know this better than the rest of us and maintain scrupulously their bank account with the soil. They are constantly building up its mineral and organic content and reducing erosion.

But the real capsheaf achievement in this country is not output per acre; it is output per man. In the Orient, land is precious and labor cheap; there they must nurse every last leaf out of every square inch of soil, and they do so with great skill and infinite toil. The same is true, in lesser degree, in Europe. But in this New World human labor is precious and land plentiful; here we excel in production per man. That is the real triumph

of our system of farm management. The individual American farm worker produces three times as much as the French or German farmer, four times the Russian, five times the Italian, seven times the Southeastern European, and fourteen times as much as the Chinese farmer.

Gross agricultural production per farm worker, in this country, *increased roughly* 44 *percent* in the 25 years between 1919 and 1944. In doing that remarkable job, the farmers scrapped 14 million of their 26 million horses and mules, replacing them with two million tractors and a host of the other machines which so greatly multiply the work that one man can do. Every additional tractor saves about 800 hours of man labor per acre. Also, by that shift 55 million acres of crop land were released from growing feed for horses to growing food for humans. During the last war period alone, our output of food was increased enough to feed 50 million more people, notwithstanding that the farm labor force dropped eight percent (1935-39 to 1944).

This is the real story behind our production of food. It is unique in the modern world and in all time. Our people, especially the young people ought to understand it as one of the anchor posts of our national economy.

Over - Grazed Range

You can't have your cake and eat it too — at least not in the range cattle business.

Tests at the Southern Great Plains Experiment Station in Oklahoma prove that. Three pastures at the Station have been grazed at various rates the last four years. The one that stocked the heaviest, to the point of overgrazing, has so far produced more beef per acre than either the moderately or lightly-stocked pastures. But the margin has decreased each year, and the effects of continuous close-grazing are beginning to show up. The grass just can't take it.

Farm Journal

Nematodes and Nematocides

Condensed from Pennsylvania Farmer

E. R. McIntyre

SEARCH has continued for fundamental knowledge of the thousands of species of nematodes (eelworms, roundworms and threadworms) which are usually too small to be seen with the naked eyes, but are present in all soils that support plant life. As long ago as March, 1918, the Bureau of Plant Industry in the U. S. Department of Agriculture issued a technical circular on estimating the nematode population of the soil. It showed sketches of the various species and ways to count them with a microscope.

The tiny organisms called nematodes puncture and enter roots, buds, leaves and seeds. They also attack plants in other ways which cause gall formations, leaf spots, dwarfing of plants, wilting, decay and similar troubles. Surveys of pest outbreaks have increased the knowledge of the distribution of nemic plant diseases. Cooperative state and federal experiments have developed new control and sanitation methods.

For instance, a disease of boxwood is now ascribed to attacks by nematodes. It was first noted on root samples from West Point, Va. The species involved belong to a group called meadow nematodes. They are extremely small forms living in roots and showing preference for root tips, which they blind. Almost invariably root decay follows. No known cure exists. It is recommended that care be taken to produce nursery stock on clean, fumigated, or otherwise sterilized soil, and as a further safeguard to fumigate the planting site with a soil nematocide, a chemical which will kill nematodes.

According to the Bureau of Plant Industry, a compound sold under trade names of D-D and Dowfume N in continuous tests has proved the most reliable soil nematocide yet explored. It appears also to be a good soil insecticide and to have certain fungicidal and herbicidal effects. The cost of treatment is about $40 an acre, which is not prohibitive on crops where nematodes are a limiting factor.

Another new soil fumigant sold under trade names Dowfume W-10 and Iscobrome D has also

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given excellent results in nematode and insect control. Soil fumigants containing methyl bromide as the active ingredient also give satisfactory nematode control when applied fresh. The disadvantage of methyl bromide is that it may escape from the mixture if the fumigant is stored too long or kept in a warm place. It does, however, permit planting of treated land three days after its fumigation, as compared to two weeks or more as required for the other ones. Where weed and fungous control are to be combined with nematode control, and where cost is not so important, as for example in seedbed treatment, chloropicrin has given the best all-around results.

Many nematodes are highly selective in the plant they use as food. According to scientists of the U. S. Department of Agriculture, the golden nematode will attach itself to the roots of only the potato, or to some of its close relatives such as the tomato. The sugar-beet nematode feeds only on that plant and some of its close relatives. The wheat nematode feeds only on wheat and a few other cereals and grasses.

These eelworms that attack plants inject into the tissues of the host plants specific chemical substances able to unlock from the plant just the food compound which the nematode needs. They use the secretions of their glands as a key to unlock these elements. The plant thus injected with the material starts to manufacture food on special order of the nematodes. In fact, the process provides the nematode with so simple and direct a food that no waste product need be eliminated.

In the case of the root-knot nematode, its injury is often attributed to climate, soil deficiencies or other causes. In parts of California root-knot has become a serious factor in truck and field crops. It often reduces vineyard and orchard yields.

The roots of infested plants are beaded with galls. The energy of the plant is wasted in trying to build up lateral rootlets, which are promptly attacked in turn by the nematodes. The size and shape of the root-knots or galls vary with the host plant and with the temperature. While they may be almost too small for observation on iris and strawberries, they are plainly evident on tobacco, sugar-beet and peaches. Of course, not all root-knot conditions are caused in this way, such as crown gall and club-root diseases.

The root-knot nematode appears to spread most rapidly in sandy soil, but may also become a pest in clay land. It tolerates a wide range of moisture conditions. Susceptible perennials, especially orchard trees, should be started only in nematode-free

soil. Susceptible annuals should not be planted where infestation is extremely heavy. Resistant varieties of important crops and root-stocks are being developed. In a recent California experiment station circular, it is stated that it is possible to get along with nematodes by raising resistant crops in rotation, with careful control of weeds. They suggest that control by starvation may be effected in the field by clean fallow, or more quickly by flooding. High temperatures kill nematodes, say the California workers —140 degrees F. kills all stages of root-knot nematodes instantly, 120 degrees in ten minutes and 110 degrees in two hours. Either steaming or baking may succeed in eradicating nematodes from greenhouse soils.

In 1941 in Nassau and Suffolk counties, Long Island, many cases of golden nematode infestation were found in potato fields. The infested area was quarantined by the state of New York to reduce the danger of its spread. The U. S. Department of Agriculture and Cornell University workers found that this pest was a slow spreader, and this gave hopes of being able to check it before it enlarged its destructive zone.

Plant Industry Bureau studies of commercial potatoes taken from infested fields in 1945 indicated that graded tubers carried considerable numbers of golden nematodes as cysts. Ordinary washing and brushing failed to remove these cysts from potato eyes. It is said that a car of such graded stock could carry away as many as 200,000 cysts, each carrying an average of 200 eggs. Methyl bromide fumigation failed to kill the nematodes on tubers at dosages safe for the potatoes. Preliminary tests showed that several mixtures, including D-D (dichloroprophylene and dichloropropane) could kill a high percentage of them in the soil. In 1946 a soil-wash treatment was developed and tried in yards, loading areas and fields not in potatoes. One disadvantage in the golden nematode battle is a complete lack of distinctive symptoms on potato plants or tubers early in the attack. Inadequate methods of detection and inability to destroy nematode cysts on tubers are both disadvantages in this work.

However, the golden nematode does not appear to present any great hazard to the whole potato industry owing to its slow rate of development and the rapidity with which science is perfecting new fumigating compounds.

In Idaho in 1943, discovery was made of damage attributed to potato rot nematode. In the original area it is known to occur on 12 farms in fields com-

prising about 40 acres. Although in one field as high as 75 per cent damage was noted, in general the degree of crop injury has been confined to spotted tubers. Idaho authorities took measures to keep infested stocks out of commercial channels. Later a similar infestation was reported by Canadian officials in Prince Edward Island, a well known potato seed growing center. It was finally narrowed down to 60 acres on six farms.

Because this caused a suspicion that these parasites might be present in other potato seed areas or their symptoms confused with late blight rot, a cooperative survey was begun in 1946 during the harvest and storage period. This survey involved the cooperation of the Bureau of Entomology and Plant Quarantine, the Division of Nematology of the Bureau of Plant Industry, and various states along the Atlantic Coast and north and west to Minnesota.

In summary, as made in late November, no rot nematodes had been found although in 85 counties of 14 states tubers were examined in farms, packing houses, and storage bins. Suspicious samples were taken for further examination in 331 locations. The results at the various state identification centers were also negative. This has been helpful because it has demonstrated that the nematode has not spread rapidly, and it has awakened a wider consciousness of its danger and ways to detect it.

Feathers for Wigs

The USDA chemists have discovered a new use for Rhode Island Red chicken feathers — they're using them for mannequin curls. The claim is made that they look and feel like human hair. White Leghorn feathers have been used for similar blond wigs. This new use is expected to lower the number of pounds of waste chicken feathers which now amounts to about 175 million pounds a year.

Capper's Farmer

Purebred Salesmanship

Condensed from The Shorthorn World

Fredric S. Hultz
University of Wyoming

The business of selling purebred animals is complicated and highly specialized. Individual success in livestock breeding is continually and indissolubly associated with success in selling. To stay in the business, a breeder must either have an unlimited bank roll or else he must know how to dispose of surplus breeding stock profitably and efficiently.

Any type of selling involves four steps, namely: awakened interest; inspired confidence; aroused desire; closing the sale. These four steps are interlaced, but each has its own technics and methods.

Have you ever wondered why you bought some specific article instead of another similar one which may have been offered to you? Perhaps you became interested in the article through an advertisement in a magazine or a newspaper. Perhaps you saw it displayed in a store window. Maybe a friend recommended it to you. In any event, you had first to become interested in it through some medium or you would have passed it by without a second thought.

The breeder is in the same position as a merchant who makes an effort to interest you in his product. The breeder's store window is his farm, and his display items are his animals. At this point in the selling the store window may be as important as the animals. Remember that you are attempting to attract favorable interest at this point. Everyone is attracted by well-kept buildings, neat fences and pastures, trimmed fence corners, and a general orderly appearance about the place. If the farm has a name, so much the better. It then assumes a personality of its own which is an important step towards securing interest.

The value of judicious, continuous advertising in periodicals and newspapers cannot be over emphasized. We all like the things which are familiar to us. The mere repetition of a breeder's advertisement month after month, or day after day, makes for interest in him and his product by thousands of readers. You will recall that many business firms with nothing to sell to the public all through the war years kept up constant advertising campaigns against the time when their products would be back on the market. They were building for interest and making sure that the public should know them when the time for selling came.

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The show ring is an interest builder, also. But more than that it serves in taking the next step in selling animals, that of inspiring confidence. Regardless of criticism of the show ring as an arbiter of quality in live stock, blue ribbons have a tremendous value in salesmanship. None of us is too cocky about his own judgment. A show ribbon can serve to instill confidence and bolster up judgment on many occasions. And, again, the advertising value, the repetition of the firm name, the display of prizes won, all contribute to both interest and confidence. They also lead us into the next step of the sale, awakened desire.

Have you ever stood at the ring side and wanted to own a handsome young bull or a sweet young heifer as they were being lined up? That is the kind of desire which leads to sales. It works just the same on the home farm. When you lead out an impressive herd bull prospect and he stands just right at the halter, and the buyer knows that you are bursting with pride over him, your sale is about made. You have the buyer desiring to own the calf. You talk about the pedigree, you exhibit the brothers and sisters, you indicate the good qualities of the sire and dam, and in so doing, you run the whole gamut of sales emotions.

Not all potential customers react the same, of course. Some buyers like to be left alone. Most all buyers like to think that they only are making the decision to buy. Some like to be flattered, their judgment extolled. Others must be browbeaten into recognizing the excellence of that which you have to offer. But everyone of them must be made to desire to own what you have to sell or you'll never close a deal with them.

The closing-up business of a sale is generally the most difficult of the four steps. The buyer may be interested, he may have confidence in your offering, he may want the animal so much he cannot wait to own him, but then, there is the little matter of price to settle. You may have an inflated idea of the animal's true worth, have actually oversold yourself on his value. Or the buyer may have only so much money and not enough to pay your price. Or he may be just one of those people who cannot come right down to a decision. In any event it is up to you to meet the situation and keep it from becoming hopeless. Be sure that your asking price is fair and is even, perhaps, in line with the buyer's ability to pay. Maybe you can extend credit for a part of the purchase price in order to not lose the sale entirely.

Thousands of prospects fail to become buyers just because the

owner fails to exert that last effort which results in a sale. If the buyer doesn't say, "I'll take him," then it is up to the owner to make it easier for that very thing to be said. People who sell things say it is a good pratice to get the prospect started to saying "Yes." There are some questions or suggestions to which he is bound to reply, "Yes." For instance you can ask if the animal isn't pleasing? You can indicate its good points and then ask, "Don't you agree with me?" You could then say, "Wouldn't you like to own him?" The "Yes" answer to that one is the $64 answer.

All of the above discourse takes it for granted that you have something good to sell, that it is what the prospect needs, and that the price is a fair one for the quality offered. No breeder will stay long in business unless he can meet these requirements for the sales he makes. Most sales are repeat business from pleased customers obtained after years of fair dealing and honest treatment.

The production of good individual animals is not enough. Breeding stock must be able to reproduce satisfactorily as well as look good. The animals must have back of them an ancestry which guarantees their reliability as breeders. The moment your customer gets off-type progeny, or a wide range of variability in the offspring, he is done with you as a source of breeding stock.

In these days of change in many things the breeder must be forward thinking so as to anticipate changes in type or form and be ready for new demands in the years ahead. If you think that type has not changed just take a look at the winners of a few years back. If you think that type is not constantly changing you are, to say the least, behind the times. It takes time to make changes in a herd of animals. The process of gestation and maturity to breeding age are time consuming in themselves. The breeder salesman must, therefore, look well ahead. All of these things are factors in successful selling.

The value of the show ring in sales promotion long has been a moot question among livestock breeders. This writer, for one, believes strongly that the high cost of a show program is compensatory but would like to throw in a few qualifications. In the first place there is no shortcut to show ring success. You could even buy last season's winning herd and be a loser at this year's shows.

Some of the factors which contribute to show ring success or failure are: (A) a competent fitter-herdsman, to whom you are willing to give a free hand. (B)

A natural generosity in the paying of feed bills and the cost of equipment, transportation, hotel bills, et cetera. (C) buildings that are oversize so as to allow plenty of room for each animal, well ventilated, well bedded, and insuring comfort regardless of climate. (D) The willingness to purchase top breeding stock so that your herd has quality bred into it.

Even if all of these factors are favorable there still remains the hazard of facing the judge in the ring. Each show is simply a reflection of one man's judgment as he passes on the classes. The integrity and the ability of judges in this country are high, but even the same man's judgment will vary from day to day, and may perhaps be influenced by such things as unrelated to the judging, as personal state of health and mind. There is, then, an element of chance in entering the show ring which cannot be ignored. For the breeder who has spent untiring effort and money in the hope of winning the "judge" hazard is a difficult one to overlook.

We might have added a factor (E) to the above list, and suggested a placid temperament. Probably more dispositions are ruined in, and around, the show ring than any place else on earth. It is useless to argue whether good sportsmanship is a matter of early childhood training, a good digestion, or a well disciplined mind. A man has it or else he doesn't. If he is a poor loser he had better stay out of the show business.

Fitting for a show is costly in feed, in time spent and in the acquisition of a herd of high quality. The fitting process begins before the animal that is a show prospect is born. His horns must be trained, his feet kept even, his coat encouraged to grow long and silky, the flies must be kept from annoying him, his diet must be above criticism. Now this little fellow must compete against similar little fellows from other herds, and take and like what he gets.

We have emphasized the hazards and problems involved in the sale of high quality breeding stock. It is only fair to direct attention also to the fun and satisfaction which comes from satfied customers; from knowing that you are aiding in a breed-promotion problem; that you are disseminating better animals throughout the country; and, in other words, to feel that you are an integral part of a great plan to make the production of livestock more profitable, more stable and more efficient in this great livestock nation of ours. Salesmanship is, and must remain, an important part of that plan.

FOR THE FARMER'S LIBRARY

A Living from Bees—By Frank C. Pellett, Field Editor of American Bee Journal. Orange Judd Publishing Co., Inc. $2.25.

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean, School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $3.50.

Bovine Mastitis — A Symposium — Edited by Ralph B. Little, Dept. of Animal and Plant Pathology, The Rockefeller Institute for Medical Research, and Wayne N. Plastridge, Dept. of Animal Diseases, Univ. of Connecticut. McGraw-Hill Book Co., Inc. $7.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers. $2.50.

Breeds of Livestock in America—By Henry W. Vaughan, formerly Prof. of Animal Husbandry, Iowa State College. College Book Co. $4.75.

Dairy Cattle Feeding and Management—3rd Edition—By H. O. Henderson, Prof. of Dairy Husbandry, W. Va. Univ., Carl W. Larson and Fred S. Putney. John Wiley & Sons, Inc. $4.50.

Dairy Science—By W. E. Petersen, Ph.D., Assoc. Prof. Dairy Husbandry, Univ. of Minn. By R. W. Gregory. J. B. Lippincott Co. $4.00.

Diseases and Parasites of Poultry — By Edgar Hugh Barger, D. V. M., Berkeley, Calif., and L. E. Card, Ph.D., Prof. of Poultry Husbandry, Univ. of Illinois. Lea & Febiger. 3rd Edition. $3.75.

Domestic Geese and Ducks—By Paul P. Ives, Pres. Am. Waterfowl Ass'n. Orange Judd Publishing Co., Inc. $3.50

Elements of Soil Conservation—By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Dept. Agric. McGraw-Hill Book Co., Inc. $3.20.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.50.

Farmers of the World—The Development of Agri. Extension—edited by Edmund deS. Brunner, I. T. Sanders, Douglas Ensminger. Columbia Univ. Press (1945). $2.50.

Farm Records—by John A. Hopkins, Ph.D., Asso. Prof. Economics, Iowa State College. Iowa State College Press. $3.00.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $6.00.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. $3.50.

Grow Your Own Fruit—By M. G. Kains, formerly U. S. Dept. of Agri.; Prof.of Horticulture, Penna. State College, Greenberg, Publisher. $3.50.

Hatchery Management — By Roland C. Hartman, Editor, Everybody's Poultry Magazine, and G. S. Vickers, Field Mgr., Ohio Poultry Improvement Asso. Orange Judd Publishing Co., Inc. $4.00.

How to Raise Rabbits for Food and Fur—By Frank G. Ashbrook, Fish and Wildlife Service, U. S. Dept of the Interior. Orange Judd Publishing Co., Inc. $2.00.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $3.00.

Livestock Production—By Walter H. Peters, Chief, Div. of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $4.00.

Livestock Judging Handbook — By Julius E. Nordby and W. Malcolm Beeson, Ph.D., Asst. Professors Animal Husb., Univ. Idaho. The Interstate Printers. $3.25.

Making Pigeons Pay—By Wendell M. Levi, formerly Pigeon Section, U.S.D.A. Signal Corps. Orange Judd Publishing Co., Inc. (1946) $2.50.

Modern Agricultural Mathematics—By Maurice Nadler, B. S., A. M., Dept of Mathematics, Newtown High School, Long Island. Orange Judd Publishing Co., Inc. $2.00.

Modern Farmers' Cyclopedia of Agriculture—By Earley Vernon Wilcox Ph.D., formerly U. S. Dept. of Agri. Orange Judd Pub. Co., Inc. $4.50.

Natural Principles of Land Use—By Edw. H. Graham, Chief of Biology Div., Soil Conservation Service. Oxford University Press. $3.50.

Pay Dirt—Farming and Gardening with Composts—By J. I. Rodale. Devin-Adair Co. (1945). $3.00.

Pork Production — By William W. Smith, Prof. of Animal Husbandry Purdue Univ. The Macmillan Co. $4.15.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry. Mo. State Univ. J. B. Lippincott Co. $5.00.

Practical Farming for the South — By Benjamin F. Bullock, now Prof. Rural Education, Atlanta Univ. Univ. of North Carolina Press. $2.50.

Profitable Poultry Keeping—By H. Clyde Knandel, Head, Dept. Poultry Husb., Penn State College. Orange Judd Publishing Co., Inc. $3.00.

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Raising Turkeys, Ducks, Geese, Game Birds—By Morley A. Jull, Prof. and Head of Poultry Dept., Univ. of Md. McGraw-Hill Book Co., Inc. $3.75.

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue Univ. The Interstate Printers & Publishers. $2.25.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.50.

Soil Conservation—By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Dept. of Agric. McGraw-Hill Book Co., Inc. $6.50.

Starting Right with Turkeys—By G. T. Klein, Extension Poultryman, Mass. State College; edited by Ed. Robinson. The Macmillan Co. (1946). $2.50.

Successful Poultry Management—By Morley A. Jull, Professor and Head of Poultry Dept., Univ. of Maryland. McGraw-Hill Book Co., Inc. $3.50.

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BOOK REVIEWS

SOIL AND STEEL—Exploring the Common Interests of Farmers and Wage Earners. P. Alston Waring and Clinton S. Golden. Harper and Brothers, New York. 1947. 233 pp. $3.00.

The authors of this book have made an able presentation of a problem which is of tremendous importance to the economic and social welfare of the nation; that of the distrust and misunderstanding which exists between farmers and wage earners, a distrust due largely to ignorance. In analyzing this problem, the authors show that basically the economic difficulties and aims of the farmer and of the worker are the same. Both suffer from economic security, both are dependent on the products produced by the other. Full employment, which the worker is striving for through his union and which means economic security to him, means a good market for the farmer. The welfare of the one is closely related to that of the other.

The authors, one a farmer, the other an official of the Steel Workers of America, C. I. O. and a Vice-Chairman of the War Production Board and War Manpower Commission, do an excellent job of presenting the case of the farmer to the worker, and that of the worker to the farmer. Their book is one that should not be missed.

FARM MANAGEMENT MANUAL—V. B. Hart, S. W. Warren, Ivan R. Bierly, Cornell University, New York State College of Agriculture, Department of Agricultural Economics, Comstock Publishing Co., Inc. Ithaca, New York. 84 p. Price $1.50

The farmer today is confronted with a number of economic problems arising from the war which will directly affect the management of his business. The FARM MANAGEMENT MANUAL is an analysis of economic trends following past wars and a practical guide to farmers in adjusting their businesses to meet these trends. It is written primarily for agricultural teachers and extension workers who will be called upon for advice in adjusting farming practices to fluctuating prices. But the MANUAL will also be of value to agricultural students and to farmers who have just begun to farm for its analysis of what factors make a farm pay, its suggestions for farm records, and how to plan farm buildings and daily chores to achieve the greatest efficiency.

TWO BLADES OF GRASS—A History of the Scientific Developments of the U. S. Department of Agriculture. T. Swann Harding. University of Oklahoma Press, Norman, Oklahoma. 1947. 352 pp. $3.50.

Every farmer knows the value of the research conducted by the U. S. Department of Agriculture. Here is a history of the gradual growth of the Department's research stations and the contributions they have made to farming. Mr. Harding writes of many of the personalities in the Department of Agriculture and gives an absorbing account of much of their work from the time it was begun until it reached completion in the form of hybrid corn, DDT, rust-free wheat and other agricultural improvements.

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